The Foundry

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HERE'S

THE COMMERCIAL STEEL CASTING CO.

●

MARION OHIO

14,750-Pound Casting Measuring 50" x 90" x 105"

The pictures shown on this page are of a vent section for a hydro-electric water pipe line installation in Birmingham, Ala. It has intricate internal coring for thin metal sections. It was cast in an all oil sand (Linoil) mold and of course the internal coring was done with Linoil. The diameter measurement is 90 inches.

Pictures on the opposite page are not of a Grecian urn, but of a 14,000-pound alloy steel casting for the Los Angeles flood control project. It is a needle valve and must withstand extreme water pressures. Casting has thin internal sections and requires a complicated core assembly, accurately spaced. It measures 76 inches in height and 71 inches in diameter. Cast in Linoil dry sand mold and Linoil cored.

"We don't make them every day, but they are not at all unusual for us," says Bill Bland, Foundry Superintendent.

THE WERNER G.

(DIVISION OF ARCHER-

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The Foundry Editorial

Industry Faces Problem of Men and Machines

JUST a year ago, when foundries throughout the country were operating at full capacity but were unable to make sufficient castings to satisfy demands for cast products of all kinds, two important weaknesses in the foundry situation readily became apparent. First, many managers found new equipment was needed badly in their plants, either to supplant hand methods or to replace existing machines which were worn out or had become obsolete through major engineering developments in the foundry equipment industry during the past few years. Second, as had been predicted on many occasions, the foundry industry experienced a serious shortage of skilled men.

At that time everybody was too busy to do much about either situation. Where the need was especially pressing, equipment was purchased in quantities, and as a result the total value of foundry equipment installed in 1937 was the highest in many years. Of course, delays were encountered in obtaining shipments and difficulties arose in making installations while foundries were in operation. While that actually needed far exceeded that purchased, foundrymen were obliged to put off desired improvemnts to avoid interrupting production schedules. Executives promised themselves that something would be done at the first opportunity.

Likewise, with old customers pressing for better deliveries and new business being turned away every day, few companies took time to organize and put in operation an effective apprentice training program. Plants already training apprentices added more boys, and a few organizations embarked on a definite apprenticeship program. More attention also was devoted to the training of foremen. But again, most executives continued to procrastinate, promising to do something about apprentices when production schedules eased up a bit and time could be spared to plan the work properly.

Are these promises being fulfilled?

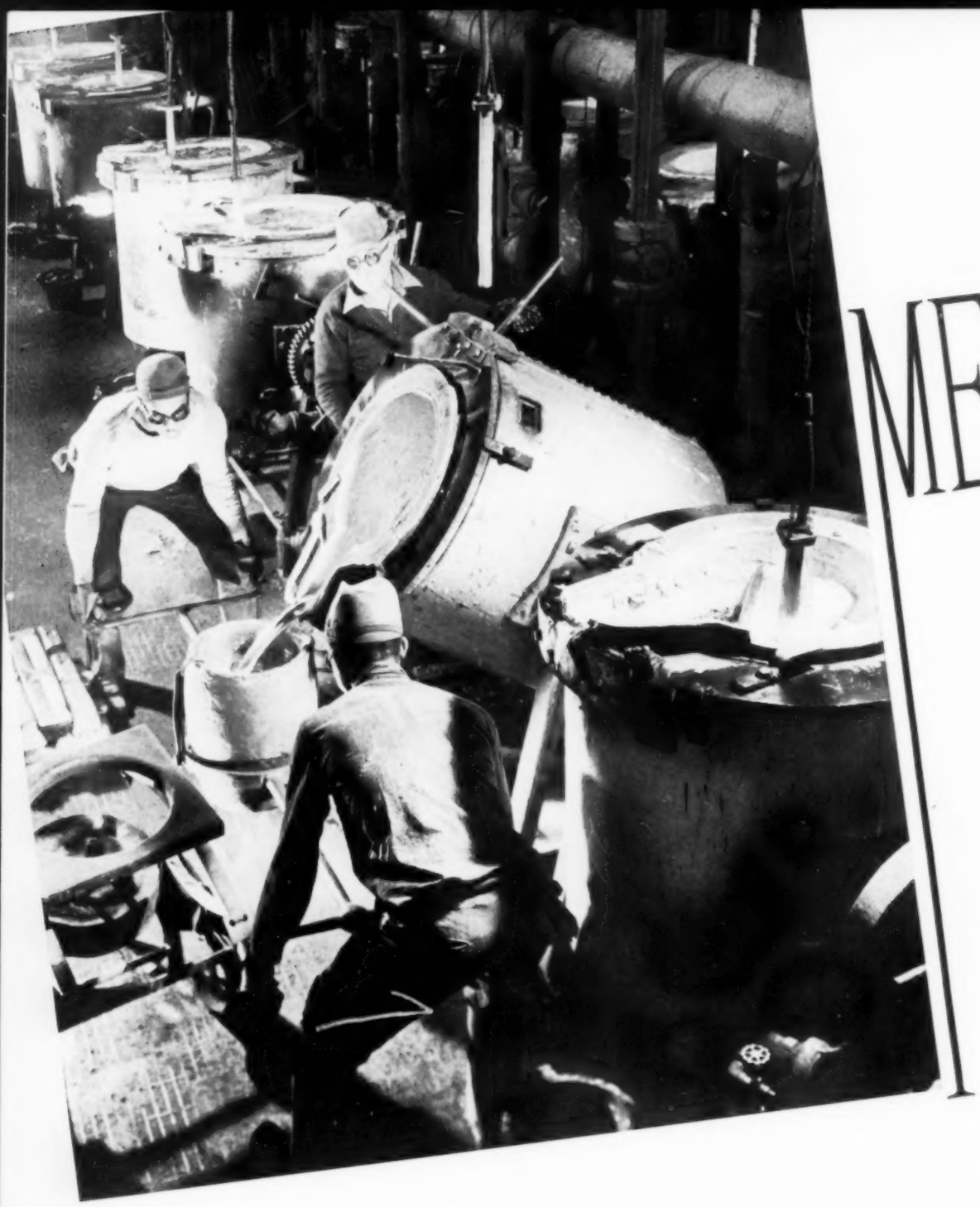
Undoubtedly considerable progress is being made. Recent reports reveal an increase in foundry equipment purchases during the past few weeks, and sustained interest in new machinery is gratifying to all concerned. Foundrymen are rather optimistic regarding the future improvement of business, but some seem inclined to be cautious in placing the final order for equipment, which admittedly will be needed and for which plans already have been drawn. Probably history will be repeated. When pronounced signs of recovery appear, the foundry equipment industry will be deluged with orders, costly delays will be encountered, and many foundrymen again will encounter the irresistible force meeting an immovable object.

Progress also may be noted in providing a greater supply of skilled men for the industry. The splendid report of the apprentice training committee of the Steel Founders' Society of America, presented at the annual meeting of that group, is the most recent contribution to the training work. After a year of study, the committee has presented details of the problem on "the why and how of apprenticeship so that operators of large and small foundries alike, in large and small communities, have their many questions and objections to an apprentice program answered."

The committee states the foundryman owes it to himself to train apprentices because mechanics are scarce, the normal loss of mechanics must be replaced, apprenticeship builds morale, mechanics trained by an organization are better than those it may hire, apprenticeship reduces turnover, training provides men for promotions, and apprenticeship training pays. The arguments set forth under these headings should be read by every foundryman in this country not now training men in the art of foundry practice. The report continues with a discussion of how to train apprentices, method of selling the organization, selecting the boys, and preparing schedules of instruction.

The Steel Founders' society, as well as other groups and individual foundry organizations are to be congratulated on the progress that is being made.

Frank G. Steinebach
Editor



MELTING A

FOREMOST among requirements for every casting is the necessity for sufficient strength to meet demands of service. It is well established that the strength of a casting of any particular material depends to a large degree on its soundness and that this soundness depends on variables which can be controlled.

One of the most readily controlled variables and at the same time one of the most frequently overlooked, is the melting practice. Between the charging of the metal into the furnace and final delivery of molten metal to the mold, there are numerous places where failure to exercise adequate control will find reflection in the final casting quality. Perhaps certain of this melting control appears unjustified in many cases and hence is overlooked when actually it is responsible for subsequent casting difficulties. Foundries producing castings of uniformly good quality are those which establish a careful melting procedure and adhere strictly to that procedure for all castings.

Aluminum alloys possess two characteristics which become important factors during melting. The first is a readiness of the molten metal to absorb certain gases, particularly hydrogen. Water vapor, hydrocarbon gases, and other hydrogen containing compounds usually are the source of this gas. These materials, under certain conditions, react with the molten metal and liberate hydrogen. This reaction increases rapidly with temperature.

The second important characteristic of aluminum alloys is the readiness with which they react with oxygen to form oxides. This is a material advantage with the solid metal since these oxide coatings account for the excellent resistance of aluminum to corrosion.

Aluminum in the Foundry

By H. J. ROWE
Aluminum Co. of America,
Cleveland

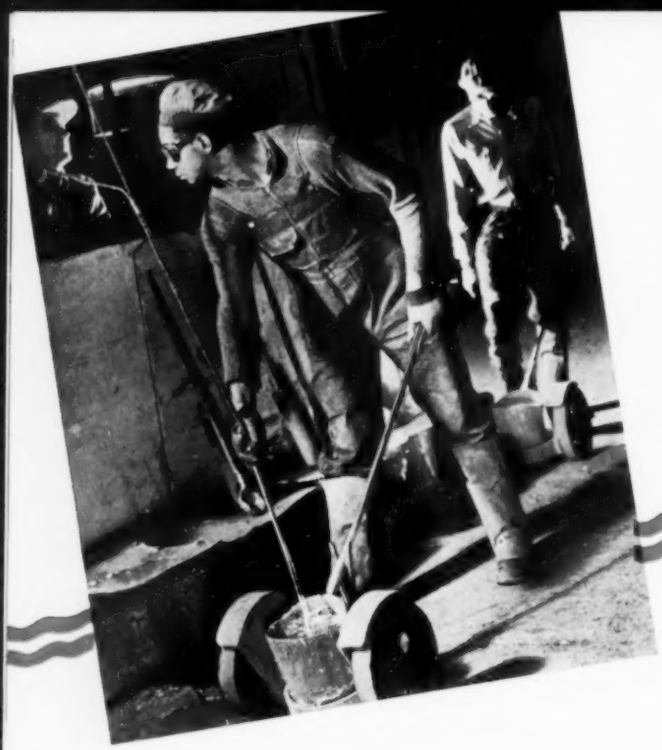
However, the oxide coating does introduce certain melting problems. Again, the amount of oxide formed during melting increases with the temperature as well as with agitation. With most of the heavier metals this would not be so important a consideration as with aluminum, since the specific gravity of their oxides differs sufficiently from that of the metal to make possible a rapid separation. The low specific gravity of aluminum alloys makes it more difficult for them to rid themselves of oxide inclusions.

First important problem in melting aluminum alloys is selection of suitable furnace equipment. This selection will depend, to a considerable extent, on requirements of each foundry, but also should be made with the characteristics of the metal in mind. Furnaces of widely differing designs are available and the choice should be made, not only from the standpoint of capacity and melting efficiency, but also from the standpoint of design which will result in minimum gas absorption and oxidation. It may be found necessary to sacrifice something in connection with furnace capacity or melting efficiency to provide design features required for the desired metal quality. In the end, such a compromise generally will more than pay for itself through improved quality of final castings.

Furnaces most generally employed for melting aluminum alloys fall under two classifications: Direct flame furnace, in which the flame or products of combustion impinge directly on the metal; and the indirect flame furnace, in which metal is melted without coming in direct contact with the heating medium.

Open-hearth and barrel type furnaces fall under the classification of direct flame furnaces. Although these provide the cheapest melting, and the open-hearth furnace is particularly suited to alloying large quantities of metal, they possess certain disadvantages for aver-

Fig. 1 (Upper left)—Tilting furnaces equipped with iron pots or crucibles facilitate the transfer of metal to pouring ladles. Fig. 2 (Right)—Metal for small castings is ladled direct from stationary pot furnaces, each provided with thermocouples protected by cast iron tubes



age aluminum foundry use. Direct contact with products of combustion requires such furnaces be operated at fairly low temperatures, that is, temperatures lower than normally are required for foundry use, to minimize risk of absorption of excessive quantities of gas by the metal. Pit type crucible furnaces, when used with aluminum alloys, should be designed to keep the products of combustion away from the open top of the crucible or fitted with a crucible cover.

Cast Iron Pots Generally Used

Indirectly-fired pot-type furnaces are used most commonly in aluminum foundries. Such furnaces may be either of the stationary type, from which the metal is ladled by hand, or of the tilting type, which permits the metal to be poured into the ladles. Cast-iron pots most generally are used with such furnaces, although nonmetallic pots of graphite or various vitreous and refractory materials offer certain advantages for some conditions. Pots of these latter materials are particularly useful for melting aluminum-silicon and aluminum-magnesium alloys, where a minimum of iron pick-up must be maintained to preserve the mechanical properties and resistance to corrosion shown by these alloys when of the desired purity.

Furnaces of either general type may be fired with gas, fuel oil, coke or electricity. Gas or fuel oil find most general use because of the convenience and economy which they offer. Coke, which is used to some extent, is relatively economical but is not so satisfactory from the standpoint of accurate temperature control.

Electricity has found relatively little use as a heating medium for aluminum melting furnaces, although theoretically it should offer certain desirable characteristics. Power cost probably has been the deciding factor against its use for that purpose. Of the various types of electric furnaces, the induction furnace appears to offer the best posibilities. Such furnaces are being used to a limited extent with aluminum alloys and may find increasing favor in the foundry field.

Without some means of measuring metal temperatures, even the best furnaces can produce inferior metal. As mentioned previously, both the gas absorption and oxidation tendencies of aluminum alloys increase with the temperature of molten metal. In addition, high melting and holding temperatures have a deleterious effect on the metal structure. Metal which has been overheated will show a coarser, more open grain structure than metal which has been melted properly, even though cooled to a low temperature before removal from the furnace. A similar effect is observed if the metal is held too long in the molten state; the higher the temperature, the shorter the time required to produce inferior results. Therefore it is essential that each furnace be equipped with suitable temperature-indicating equipment, if not with automatic temperature control, to insure maximum metal quality.

Color Changes Not Sharp

In neither the solid nor liquid condition do aluminum alloys show their temperature by sharp color changes. It is not possible, therefore, to judge the temperature of molten metal by its color, as in the case of certain other metals. The measurement of aluminum temperatures requires the use of suitable pyrometric equipment, such as the thermoelectric type. Suitable equipment comprises a thermocouple, suitable compensating leads, and a milivolt meter calibrated to record the temperature. Closed or beaded end thermocouples of chromel-alumel wires, protected by a cast-iron tube, are generally used for measuring temperatures in the melting furnaces. An open-end couple, made from No. 8 gage asbestos-covered chromel-alumel wires, provides a rapid and accurate means of determining temperatures in pouring ladles. Portable pyrometric equipment, capable of being (*Please turn to page* 72)

Fig. 3 (Upper left)—Open end thermocouples provide a rapid means of determining the metal temperature in pouring ladles. Fig. 4 (Center)—Pouring with a short, unbroken metal stream results in castings with a minimum of oxide inclusions. Fig. 5 (Below)—A temperature station on the foundry floor for checking and recording metal temperatures in pouring ladles

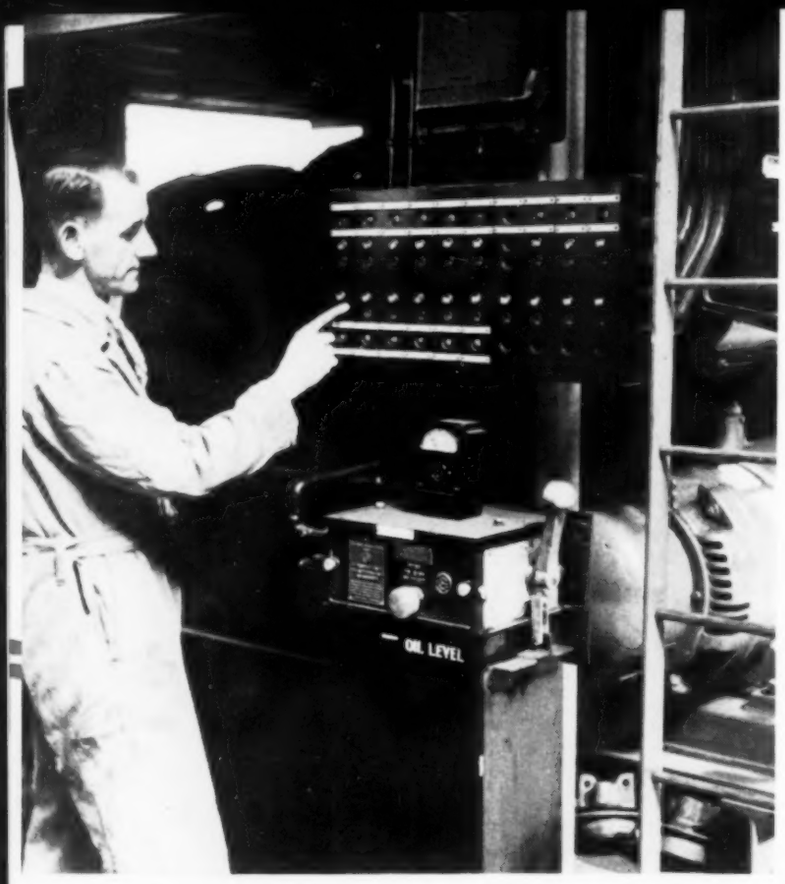


Fig. 1—Sand conveying, mold conveying, and operation of the sand plant is interlocked and controlled by a master control panel

Push

By VINCENT DELPORT
European Manager, The Foundry

PLANNING of a mechanized foundry depends not exclusively on output, but basically on the type of castings to be produced. In the case of a given type of casting to be made on a production basis, a mechanized unit can be planned specifically for the purpose. An interesting case is that of the Midland Electric Mfg. Co., Ltd., Birmingham, England.

This concern has specialized, for the past 30 years, in the manufacture of electrical switch gear. The castings, which are machine-molded, can be classified generally as flat castings, consisting mainly of shallow boxes, with walls of a thickness ranging from 3/32 to 3/16-inch, the hollow part of the boxes ranging from 1 to 4½ inches in depth, and the weight from a few ounces to 15 pounds.

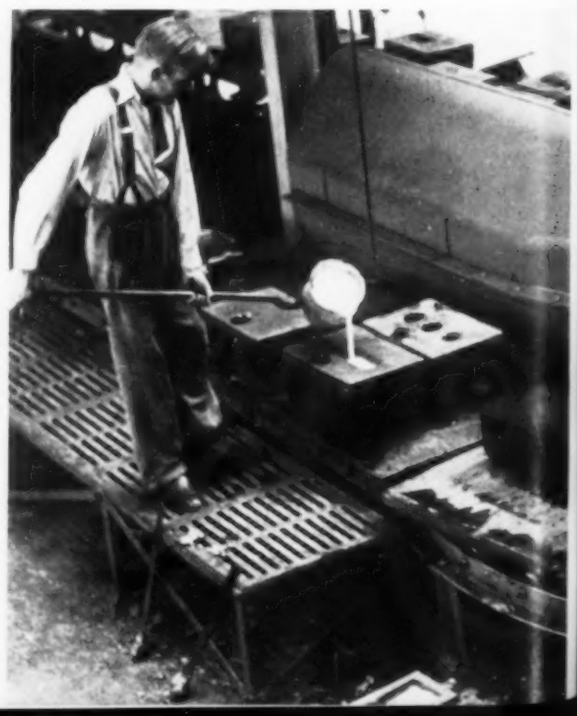
Plan To Treble Output Eventually

At present, one mechanized unit is devoted to the manufacture of these castings. This unit has an output of 50 tons of finished castings per week, and it is self-contained. Plans for extension have been completed for some time, and eventually the output will be trebled. Fig. 5 shows the layout of the foundry when completed. For the time being, the unit seen at the top of the plan is in full operation, having started on June 1, 1937. Construction of a second unit, almost identical with the existing one, is already well advanced, and the third unit will be erected at a later date.

Design and layout of these units has been planned most carefully, one of the main features being that the whole system—sand-conveying, mold-conveying and the operation of the sand plant—is interlocked and controlled by a master control panel, seen in Fig. 1. As a result, in normal operation the whole unit works according to plan, with an even flow of materials and molds regulated, as regards rate of speed, in accordance with the rate of output.

For the purpose of this article, the description of the unit now in full operation will suffice to explain the working of the whole foundry when completed, bearing in mind that each unit will be independent of the others. At present, the unit is run on two 8-hour shifts per day.

As already stated, the normal output of the unit is approximately 50 tons of finished castings a week. Ordinary gray iron is used. The melting plant comprises two cupolas, of 3 to 5 tons per hour capacity, each cupola running for 17 hours a day on alternate days. One of the cupolas is of the balanced-blast type, the other being of the ordinary type. Comparison between the two systems is being made. In view of the fact that only small quantities of molten iron are tapped at any given time, the syphon brick method of tapping molten metal from the cupola is used.



Buttons

Control English Foundry

Pig iron, coke, scrap, etc., are stored outside, behind the cupola plant, and handled by a gantry crane. Materials are brought up to the charging platform in skips and discharged into bins from which the various constituents of the charges are weighed separately on a dial weighing scale. The metal charge usually comprises about 40 to 50 per cent of home scrap. In view of the type of castings made, about 40 to 50 per cent of gates, risers, etc., consistently return to the stock of scrap.

One of the features of the layout is the sand reconditioning plant and sand-conveying system, which handles about 30 tons of sand per hour. Following the route from the point where the molds are being shaken out, it should be mentioned that a large proportion of the molds are of the flaskless type. The shake-out station is designed to deal both with boxless molds and with molds made in flasks. Fig. 6 shows the arrangement. The molds arrive at one end of the unit, on a plate conveyor, the metal having been poured at the other end.

If the mold is contained in a flask, an operator brings it onto a vibrator by an hydraulic pusher, which is shown clearly in the illustration. Sand falls through

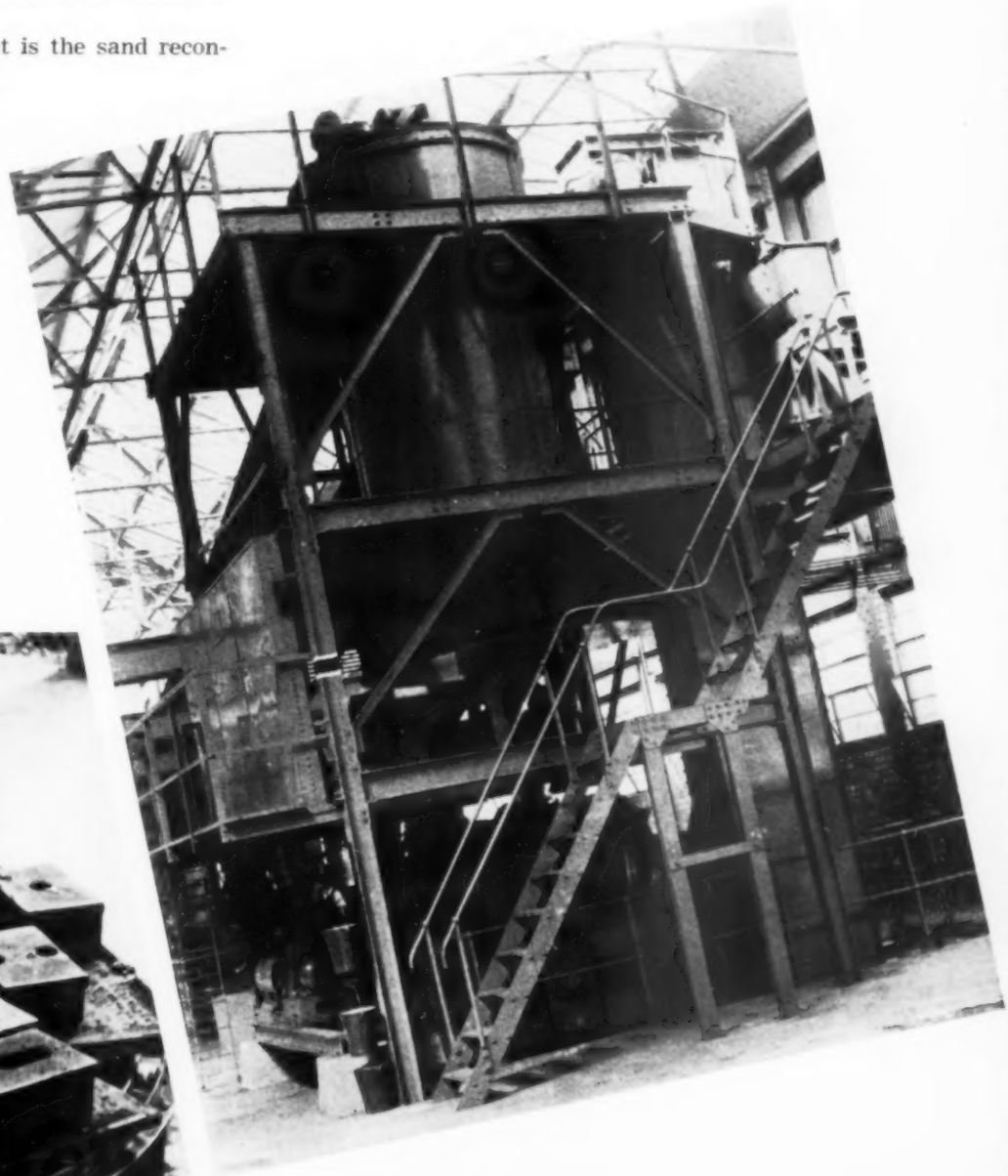


Fig. 2 (Left below)—Pouring station is located near the end of the conveyor and opposite the cupola. Fig. 3 (Right)—Final conditioning of the sand is accomplished in the various units shown in this view

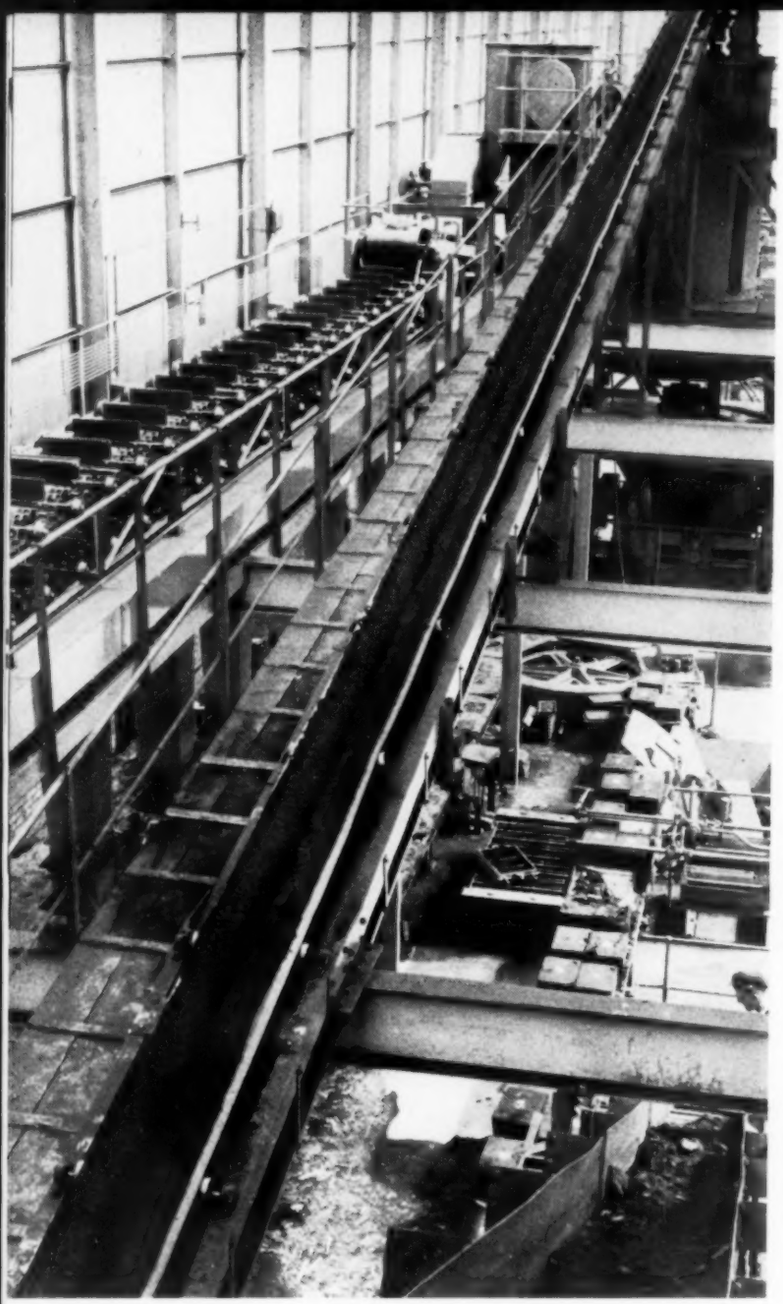


Fig. 4 (Above)—Conveyor belt carries the sand after screening to a storage hopper some distance away. Fig. 5 (Below)—General layout or plan of the foundry as it will appear on completion of the work

the bars on to a belt conveyor below the ground which discharges the sand onto an inclined steel apron conveyor. When boxless molds arrive, they pass the vibrator grid and the conveyor plates are tilted automatically, so that the molds drop complete on to the steel apron plate conveyor below. A ridge at the edge of the mold conveyor plates prevents the bottom plates from falling.

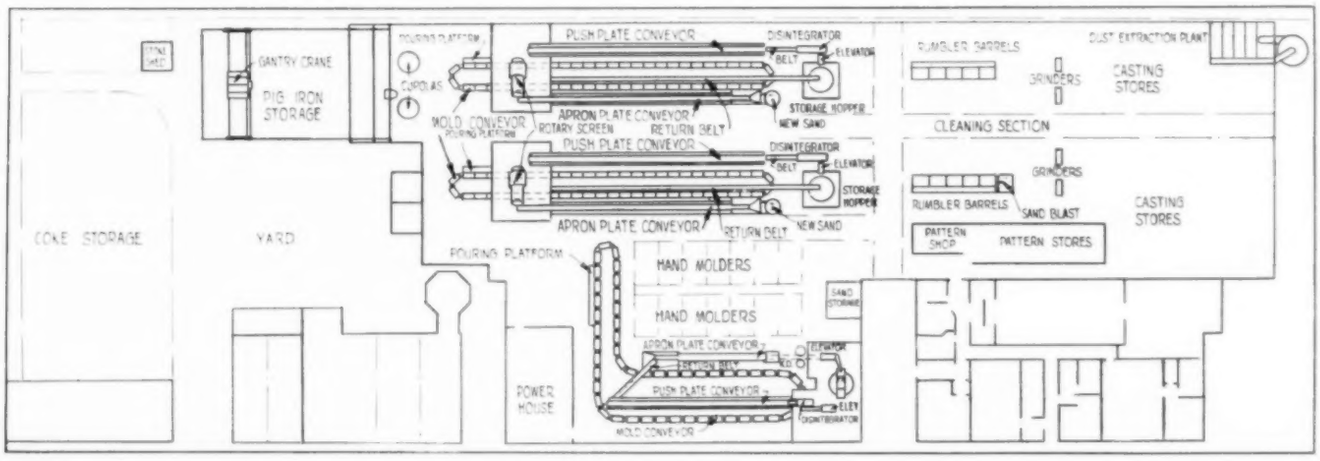
The top edge of a hopper can be seen at the bottom of the illustration, against the turning end of the mold conveyor. This is a rotary-controlled hopper, which stores and delivers new sand in the required proportion. A rotating disk is at the bottom of the hopper and the amount of new sand delivered on to the apron plate conveyor is regulated by the distance between the lower edge of the hopper and the disk. When the used sand from the molds drops on the above conveyor at the shake-out station, it therefore falls on top of a supply of new sand arriving from the hopper.

All the Sand Is Reconditioned

Used sand, the new sand and the castings are raised by the inclined conveyor seen in Fig. 6 behind the shake-out station. A man standing on a platform picks up the castings, from which he knocks off the sand and then drops the castings down a chute into a trolley bin. The sand is then carried up to the first section of the reconditioning plant, which is seen on a platform in Figs. 7 and 8.

The sand first drops through a funnel into a cooling drum, where the new sand and the used sand begin to be mixed. Following the cooling drum is a screen, which revolves under a suction hood and permits the sand to fall through onto a conveyor which also handles the surplus sand which has not been dropped into the molding machine hopper. This belt conveyor drops the sand onto an inclined belt conveyor, into which a certain proportion of coal dust also has been added.

The amount of coal dust delivered is controlled by a rotary hopper similar to the one used for new sand. Pieces of metal and foreign matter are retained by the screen and discharged at its mouth. A magnetic belt separator is located at the beginning of the belt elevator. This picks up and throws out any pieces of metal that may have (*Please turn to page* 80)



Are You Meeting Your Responsibility

By DAN M. AVEY
Secretary-Treasurer
American Foundrymen's Association, Chicago

This article is from a paper presented at the recent foundry conference held in Milwaukee under the joint sponsorship of the Milwaukee Chapter of A.F.A.; University of Wisconsin; and the American Foundrymen's association

RUNNING a foundry today is quite different from what it was 20 years ago, 10 years ago—yes, or 5 years ago. Just wherein have major changes been encountered?

Take seven major factors in which there has been the most sweeping change as between foundry management in the early part of the century and today. They may be listed as follows:

1. Improvement in quality demanding closer supervision of manufacture, materials and product.
2. Mechanization bringing need for practical knowledge of engineering.
3. Larger investments in plant, properties and inventory requiring financial judgment.
4. Keener competition compelling merchandising knowledge.
5. Altered man-power factors requiring improved personnel relationship.
6. Swiftly changing economic developments demanding awareness of public tastes.
7. Steadily broadening influence of government and politics on business requiring participation in public relations.

Foundries Show Large Investment

Of course, castings manufacturing firms, with few exceptions, are not large establishments. Nevertheless, there are over 5500 of them in the United States and these, together with the related enterprises which manufacture equipment, supplies, materials, fuels, metals, patterns, etc., conservatively represent a capital investment of over one billion dollars. This is no minor industry even when compared with the steel industry with its four billion dollar capitalization. To manage a plant which is an integral part of this tremendous industry and to meet the changing conditions previously referred to, requires no small amount of ability.

Reverting to those factors which have made today's management job an undertaking requiring a higher degree of competence, consider the first; improvement in quality demanding closer supervision. Whether it be in brass, malleable, steel or gray iron, the consumer of castings today asks and receives physical qualities, resistance to all sorts of abrasion, shock, wear and corrosion that were almost unknown two decades ago.

Even in the matter of tolerances on finished castings, a different gospel prevails. Go and no-go gages measure dimensions that were unattainable except by the most painstaking careful hand work in the early nineteen hundreds. Today on heavy production work where hundreds of castings are produced per hour, the user demands and receives as low as 0.006-inch on the finished surface. A combination brake drum and hub for automotive service, daily must meet this tolerance. Management is the answer to these requirements which the foundry industry is meeting today.

Improve Mold Handling Equipment

The second factor is mechanization which brings the need for practical knowledge of engineering.

From the time Joe Wilson first sought some kind of molding equipment to expedite the production of Cadillac cylinders, and Sam Sleeth at Westinghouse developed ideas of his own on mold handling equipment, foundrymen constantly have designed or made workable mechanical devices which are of definite aid in producing castings. This is not deprecating manufacturers of foundry equipment, but rather acknowledging what they themselves affirm—that foundrymen often either originate or make workable the most valuable mechanical aids. Where can this work be furthered today in the high state of mechanization which has been reached? Through informed foundry management.

Next, should proper management ability embrace that instinct, intelligence or what you will, that constitute financial judgment?

Not so long ago it was only necessary to have a small enclosure, a little sand, a little metal, a crucible or a

boiler shell cupola and you were in the foundry business. Today it requires much more money to get into the foundry business, and it requires financial judgment to stay in after the first castings are made.

The decease of the foundry industry has been predicted by the makers of other competitive materials for many years. The fervency of the prophesy varies with the source. It was once thought that forging would make castings vanish from the face of the earth except for the manufacture of the cannon stove. Then welding threatened to foreclose the mortgage and throw casting out into the street. Now, we hear thunders on the left from the manufacturers of plastics. If all of these competing materials had reached their present state of progressive improvement and castings manufacture had stood still, we might listen with more credence to the obituaries so hopefully advanced by others for the foundry industry.

Nevertheless, it does take a high quality of merchandising ability in any phase of the foundry industry to stay in business today. The foundry manager who is aware of the qualities and attainments of his competitors, who has learned the hard lesson of proper cost finding and prices based upon cost, has nothing to fear. Unfortunately, that characteristic of good management, merchandising sense, is perhaps the most difficult to find. The foundry industry has developed some exceptional sales minded managers. It needs more.

Requires Knowledge of Personnel Relations

We all are aware, some more painfully than others, that there has been a marked change in the man power problem of the foundry industry. While castings manufacture requires perhaps a little less of the manual dexterity, certainly much less of exceptional physical endurance, it does require intelligence and knowledge secured through training. To procure, train and employ men upon a contented basis today, requires better knowledge of personnel relations than it did 20 years ago. Good management, therefore, must embrace that quality.

Next we have the increasing tempo in economic development which demands of the foundry manager an awareness in public tastes that would have been entirely unnecessary at the start of the century. To mention only a few examples, consider the quick change in castings demand brought about by developments in automotive manufacture, in mechanized agriculture, in the urgent need for housing, in the dawning era of air conditioning and a hundred other items that will occur to the foundry manager who is aware of what is taking place. On the other side of the picture, you have the influence of quick change in market conditions of the products used in foundries. The changing fortunes of established businesses, the decline or obsolescence of manufacturing firms that are customers of foundries should not explode in the face of the well-informed foundry manager of today.

Then we have the steadily broadening influence of government and politics requiring participation in public relations. A Federal tax law may make the difference between profit and loss on the books of any foundry within a few months time. Federal taxes may block purchases of equipment badly needed to lessen costs. State sales tax upon commodities used or products shipped may exert a similar far reaching effect, change market and sales areas. Taxes upon income, reserve, social security and the regulation of competitive business practices constantly press in upon all industry.

Regulations affecting employes, hours of labor, minimum wages, age requirements and a thousand and one other concerns of the government in relation to private business were undreamed 20 years ago. Look about you today. Do not these require alertness on the part of foundry management? Do they not require, after all, a more active participation in what we know as public relations; namely, the influencing of public opinion that these things may not overwhelm us?

Up to this point we have considered foundry management today in relation to what it was and what it required in years past.

Can we safely look ahead?

Who can deny that under the seven main headings previously discussed, foundry management will require even greater ability during the next 10 years than it did in those which preceded?

Most certainly we can expect no decrease in demand for higher quality in the immediate or more distant future.

Further Changes Due in Future

Mechanization has lagged due to a combination of circumstances, lack of cash reserve due to the depression and taxes more than any other cause. But it will recover and advance.

The future will require more, rather than less, capital to get into the foundry business and stay there from this time forward. We can expect no diminishing in the competitive relationship between industries and particularly between the foundry industry and those which produce or fabricate by other methods.

No great change and certainly no retrogression can be expected in the relationship wherein outside agencies deal with the employe. Call this social progress or what you will. Every trend toward social change since the dawn of time has advanced spasmodically, but has not followed the pendulum principle. Socialization may be accelerated, may swing too far toward what we at the time regard as the left, but it never returns to a standing position nor far toward the right.

Complexities of modern life most certainly indicate that the changing pace of economic fundamentals will not decelerate. Federal, state and local governmental agencies will have more and more to say and do with regard to every kind of business. Is all of this pessimistic? Should foundry managers close the door, hang out the crepe and call for a shovel?

This does not seem to be the state of mind of foundry managers with whom I am familiar. Rather they recognize new conditions. They appreciate that we are living in a different era. They understand the fact that fundamentally all of the problems of today including the problems of foundry management stem back to one basic problem. Employment.

How much does the foundry industry contribute to the national income in the (*Please turn to page* 77)

HOTEL RESERVATION BLANK

CONVENTION AND EXHIBIT

AMERICAN FOUNDRYMEN'S ASSOCIATION

May 14-19, 1938 — Cleveland, Ohio

Mr. Mark Egan, Secretary 193

A. F. A. Cleveland Housing Committee
1604 Terminal Tower
Cleveland, Ohio

Dear Sir: Please make hotel reservations noted below:

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Hotel ..... Second Choice

Hotel ..... Third Choice

No. of Rooms ..... with bath Rate Preferred $ ..... to $

No. of Rooms ..... without bath Rate Preferred $ ..... to $

Arriving May ..... Hour ..... A. M. ..... P. M. Leaving May .....

Room or rooms will be occupied by: (Please designate those who are to occupy same room)

Name ..... Company or Business Connection ..... City ..... State .....

(List Additional names on separate sheet)

Applicant .....

Business Connection .....

Street Address .....

City ..... State .....

NOTE: If the hotel of first choice is unable to accept the reservation, the Hotel Committee will endeavor to comply with your second or third choices in the order named. You will receive direct confirmation from the hotel accepting the reservation when made. Additional hotel application blanks will be forwarded on application to the American Foundrymen's Association, 222 West Adams Street, Chicago, Illinois.

Exhibits Open — Saturday, May 14, 1938 Convention Opens — Monday, May 16, 1938

Cleveland has an ample supply of hotel rooms for all convention visitors. However, to be sure of accommodations handy to the convention hall, the housing committee suggests reservations be made at once.

A. F. A.

Plans Opening Day Program

REPORTS from headquarters of the American Foundrymen's association indicate the 1938 convention and exhibition of the association, to be held in the Public Auditorium at Cleveland, May 14 to 19, will be the largest in recent years. Space reservations for the show are heavy and word from various sections of the country predicts a large registration for foundry week.

Saturday, May 14, the opening day, has been designated as Northeastern Ohio day. Doors of the exhibition will open at 1 p.m. and will close at 10 p.m. on that day. A committee of the Northeastern Ohio chapter, with Ralph H. West, West Steel Casting Co., chairman, and B. F. Lambert, Diamond Alkali Co., vice chairman, will supply tickets to all foundry employes in the district. Undoubtedly, this will be one of the big days of the exhibition and convention of association.

Annual stag party on Tuesday evening, May 17, will be one of the outstanding features of the convention activities. This annual affair, arranged this year under the joint auspices of the Northeastern Ohio Chapter, the Foundry Equipment Manufacturers association and the A. F. A., will be held in Public Auditorium. A committee headed by L. P. Robinson, Werner G. Smith Co., as chairman and Arthur J. Tuscany, Tuscany, Turner & Associates, as vice chairman, will arrange the details for the event.

Other special events include the entertainment program for the ladies, the annual banquet on Wednesday evening, the plant visitation program, and other features. Details of all convention activities will be presented in the April and May issues of THE FOUNDRY.

Standardize Your Cupola Practice

By GARNET P. PHILLIPS
International Harvester Co., Chicago

This is the second and concluding article of two from a paper prepared by the author for the recent Iowa Regional conference held at the State University of Iowa, Iowa City, Iowa under the joint sponsorship of the Engineering college of the university, Quad City chapter of the A.F.A., Northern Iowa Foundrymen's association, and the American Foundrymen's association. The first article appeared in the February issue.

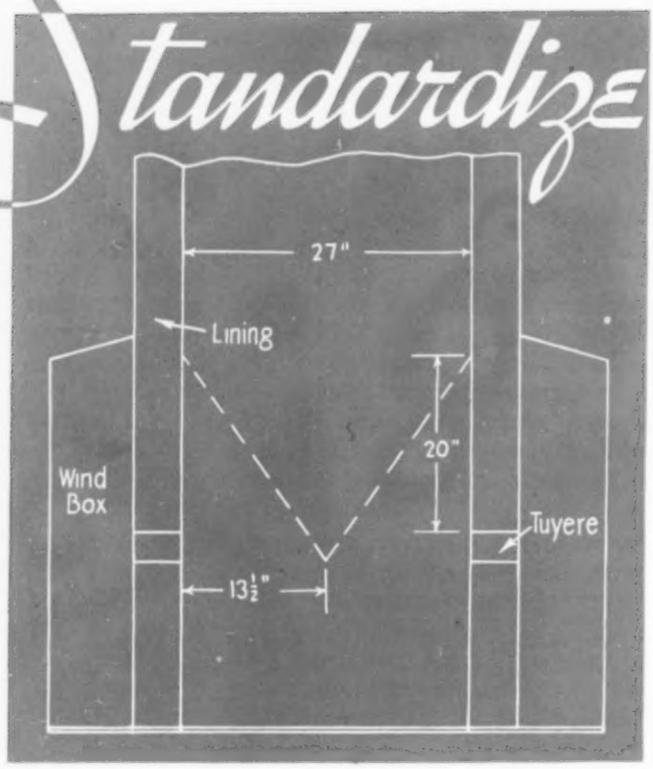


Fig. 5—Section of cupola showing upper boundary of the region of combustion

RESULTS obtained in the Bureau of Mines investigation and presented in tabular form in the article presented in the February issue, are shown graphically in Figs 6 and 7, each of which gives data for one position in all planes. Study of the data shows that the upper boundary of the region of combustion (points of maximum carbon dioxide content and minimum free oxygen) corresponds to an inverted cone, as indicated in Fig. 5, with the base at a point about 19 inches above the top of the tuyeres. Actually the line of maximum combustion and highest temperature is probably a curve.

Attempts were made by investigators to measure temperatures at the same points in the fuel bed. The first tests were made in plane *A* with a platinum-platinum-rhodium thermocouple protected with a highly refractory clay tube. The temperatures obtained were as follows: Plane *A*-1, 2953 degrees Fahr.; plane *A*-2, 2430 degrees Fahr., and plane *A*-3, 1576 degrees Fahr. It will be recalled that plane *A* was 1-inch above the tuyeres. The highest temperature obtained (2593 degrees Fahr.) was at the center (position 1).

When attempts were made to measure temperatures in plane *B* the clay tube was sheared off although it was noted that at the center in plane *B* the platinum-platinum-rhodium couple melted, showing a temperature above 3100 degrees Fahr. A pier of magnesite brick was built in to prevent the shearing off of the tubes but the clay tubes melted.

Use of an optical pyrometer sighted through water cooled tubes was tried but low results were obtained. To obtain a true picture of relative temperatures in the fuel bed water cooled copper tubes were used and the amount of heat absorbed by the circulating water measured.

Without going into details of tests it was found that, in general, heat measurements and gas analyses showed excellent agreement and proved rather conclusively that the zone of highest temperature corresponds to the zone of complete combustion with maximum carbon dioxide content and minimum free oxygen content.

In reviewing these data it must be borne in mind the distances above the tuyeres are for the blast pressure of only 5.3 ounces per square inch obtained with the setup used and hence with rather low gas velocity through the cupola. As the size of cupola increases and blast volume and pressure increase, these zones are moved upward and a higher fuel bed is used.

The data show that melting of metal charges should take place at the point of highest temperature and zone where free oxygen is absent. In practice that zone can be determined by observing the zone where greatest burning out of lining occurs as that is the hottest plane in the cupola and is over 3100 degrees Fahr. if the proper operating conditions are maintained.

A few other points of interest were developed by the bureau of mines tests. When a bosh was used above the tuyeres free oxygen persisted up through the whole charge and was thought to be due to increased velocity of the gas through the coke. It was claimed that use of an upper row of tuyeres was unnecessary and possibly harmful as this would introduce more free oxygen at a higher point in the fuel bed.

When large sized coke was used exclusively, oxygen persisted through the whole charge. This was thought to be due to openness of the charge which allowed a portion of blast to pass up the walls in a more or less unobstructed manner. In tests mentioned previously coke of 3 inches or less in size was used exclusively.

In considering all data given so far regarding melting and combustion in the cupola it should be realized that the melting conditions wanted are for maximum temperature with minimum oxidation and smooth opera-

tion with resulting molten metal that is uniform both chemically and physically day after day. A cupola may be operated under widely varying conditions with results of a sort obtained.

Coke will burn with a small amount of blast and with a large amount but the resulting metal will be tapped at varying temperatures and with varying chemical analysis due to changes in silicon and manganese losses and to changes in carbon and sulphur increases. If all rational conditions of operation are complied with day after day good results can be obtained with cupola melting much more economically than by any other known method.

Should Standardize Operating Methods

If foundry operating conditions force the use of cupola operation procedure that does not conform to the data given, the procedure that is adopted should be standardized and held constant day after day if uniform molten metal is to be expected. The blast should not be cut way down if iron is temporarily being melted faster than it can be handled nor should the blast be increased if a demand for more metal temporarily occurs.

This does not mean that a given sized cupola cannot be used for various melting rates within reasonable limits. When the rate of melting is changed with its resultant changes in effects on metal oxidation losses and carbon and sulphur increases, the composition of the charges must be changed accordingly and the new set of conditions held constant. Daily changes in cupola melting procedure are the ones to be avoided if uniform metal is expected.

Minor changes in the metal charges necessarily are made at frequent intervals, due to some variations encountered in both fuel and metal used. These changes can only be made correctly by one in active charge of and in daily contact with the melting and laboratory departments respectively.

As stated previously, the author believes that a coke to iron ratio of 1 to 8 is good practice in automotive foundries where metal at high superheat is required for the thin sectioned castings produced and where maximum machinability consistent with other physical properties is mandatory. Instances can be cited where coke to iron ratios of 1 to 15 down to 1 to 4 are used regularly, both being exceptional cases, representing the result of numerous compromises and conditions peculiar to any of the particular plants in question.

The cupola is a furnace of relatively high thermal efficiency as the fuel burned is in direct contact with the metal charges and the hot gases formed preheat the descending metal charges before they enter the melting zone. Relative thermal efficiencies of various cupola operations may be compared when the amount of fuel consumed in preheating, melting and superheating a given quantity of metal is known.

Determination of the true thermal efficiencies is difficult to make as it involves measurement of all heat losses in addition to heat used in bringing metal up to a certain temperature. These losses include heat in the lining and radiated from the lining, heat required to evaporate and dissociate water in coke, that required to melt and superheat slag formed, heat in escaping gases, etc. In addition heat is evolved in burning some silicon and manganese from the iron as well as hydrogen from water vapor. Some carbon in the fuel is absorbed normally (principally from CO formed) by the metal.

Boshed Cupola Shows No Advantage

A study of melting operations of 18 production cupolas lined to 54 inches inside diameter was made and the results given in a paper in 1929 by Dr. E. E. Marbaker. Nine of the cupolas were straight lined and 9 were boshed from 42 to 50 inches. The relative thermal efficiencies determined as outlined were 31.3 per cent and 31.7 per cent respectively. Average melting rate of straight lined cupolas was 10.3 tons per hour and average coke to iron ratio was 1 to 8.3. Use of a bosh was shown to be of no real advantage as far as efficiency of operation was concerned.

Linings of all melting furnaces must be highly refractory. That is they must be capable of withstanding high temperatures without fusing or softening unduly, must not crumble or crack, must have minimum contraction and expansion on cooling and heating, must have low heat conductivity and gas permeability, and must resist mechanical abrasion and chemical attack by substances brought into contact with them. No one material has all of these properties in the desired degree so that the material best suited to a particular set of conditions has to be selected.

Refractory materials used in connection with cupola melting operations are fire- (*Please turn to page* 86)

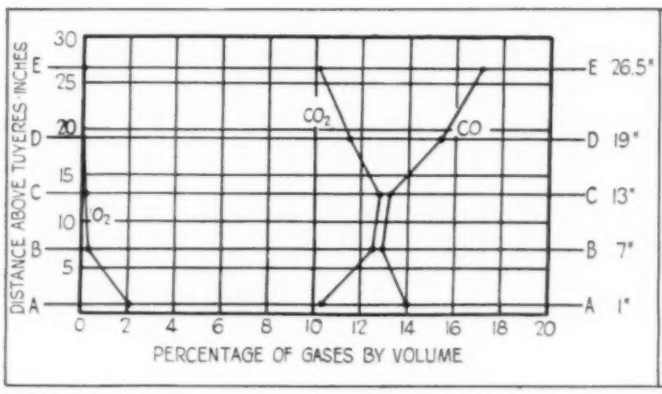


Fig. 6—Variation in oxygen, carbon dioxide and carbon monoxide 4½ inches from the center of the cupola.

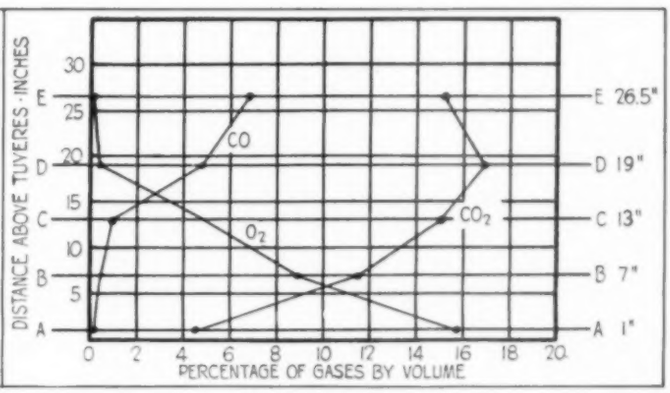
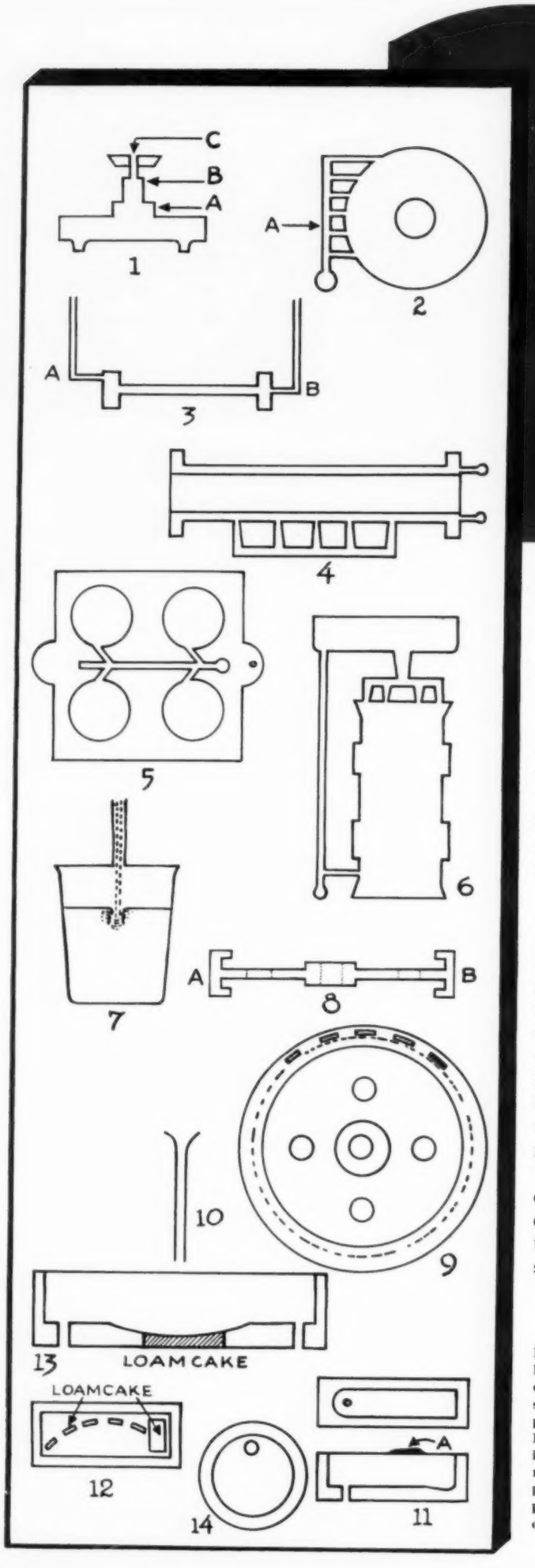


Fig. 7—Graphic representation of the percentages of oxygen, carbon dioxide and carbon monoxide 9 inches from cupola center

Runner System To Suit Casting

R. F. COATES



IMPORTANCE of the runner system for gray iron castings cannot be emphasized too strongly. The system is made up of the runner bush, down sprue and gates or inlets to the mold cavity. Each of these must be considered individually as parts of the system. Their sizes must be in proper relation, one to another.

Essential duties include conveying the metal from the ladle to the mold, preventing the entry of any dross, distributing the metal evenly over the mold surface with as little commotion as possible, and the production of a completely run and sound casting. The down sprue should be of sufficient area to fill the gates, and the runner bush should be large enough to keep the entire system filled during the pouring period.

Metal Poured at Three Speeds

Generally speaking, metal is poured at three speeds, slow, standard and fast. Each is particularly adapted to a different class of castings. Slow running in a number of adaptations fills a mold at a speed which allows the metal to take its liquid shrinkage gradually while the metal rises in the mold. Use of this method is shown in Fig. 1, where the boss *A* on a small motor flywheel is fed by the large sprue *B*. The pencil runner *C* on the top is made by a core in the bottom of the runner bush.

Similar castings without the boss can be produced clean and sound by a series of small gates around the edge as shown in Fig. 2. The runner *A* should be in the cope part of the mold to serve as an effective skimmer.

General engineering cast- (*Please turn to page* 83)

Figs. 1 and 2—Metal is poured slowly through small gates. Fig. 3—Wrong type of gate at A; right at B. Fig. 4—End gates on pipe preferable to side gates. Fig. 5—Best position for sprue is at end of runner. Fig. 6—Liners, bushings, etc., are poured through a ring of pop gates around the core on top. Fig. 7—Action of falling metal illustrated by water falling into a glass. Figs. 8 and 9—Heavy fly wheel and recommended method of gating on top of rim. Fig. 10—Top of sprue or pouring cup is flared. Fig. 11—Top and sectional views of pouring basin. Fig. 12—A loam cake is placed in the bottom of the runner basin. Fig. 13—Another application of the loam cake. Fig. 14—Small circular pouring basin

Refractory Cost May Be Cut

Nonferrous Foundry May Profit Through Study of Melting Problem

By N. K. B. PATCH

QUESTION of refractories is one that is little understood in the melting department of the average brass foundry. Nevertheless it is one deserving careful attention since refractories have an important bearing on metal costs. In furnaces producing molten metal by melting in crucibles, the class of refractory is not quite so important as in cases where the metal actually comes in contact with the furnace lining. However, manufacturers of refractories have been improving crucible furnace materials during recent years, and the foundryman should determine whether he now is using the most desirable refractory available for his type of furnace.

Furnace Lining Reacts with Metal

In this discussion we are interested more particularly in the kind of refractories for furnaces in which the metal rests in contact with the refractory lining—the reverberatory type. It is not well understood by foundrymen that at elevated temperatures, the materials in the firebrick or monolith lining are capable of reacting chemically with the metal or metal oxides to produce slags.

These slags remain in the furnace after the metal has been poured, or come out with the metal, are skimmed from the surface, and are considered the normal condition of affairs. The linings produce a certain number of pounds of product before they are renewed, and this again is considered fairly good practice without any study as to whether maximum or approximate maximum value is being secured from a given lining.

While a lining may appear to be relatively inexpensive because it costs little, it may be expensive because it has to be renewed frequently. The labor of taking out the old lining and replacing with a new one frequently is more than the cost of the lining itself and to have this labor repeated frequently becomes a burdensome expense that should be reduced to the absolute minimum. The only method of reducing is to use the kind of lining that will resist slagging and will stand up under the service demands for the maximum length of time.

Select Proper Type Refractory

There is a wide variety of refractory materials, all of which have their proper applications and there are certain places where each is best suited. There are three types of refractory—basic, acid and neutral. An acid refractory, such as silica brick or brick in which silica is a prominent component, is not desirable for the hearth of a furnace in which copper and its alloys, or aluminum and its alloys with copper are to be melted.

Oxides of some metals, such as lead, tin, zinc, or even copper, react with some of the silicates in acid brick. Consequently, that type of brick is not desirable for linings upon which these metals are to be melted. Bricks of aluminum oxide (alumina) are resistant to the effect of chemical reaction by the metallic oxides produced in the melting of nonferrous metals. There are a number of other types of refractory materials that are equally resistant.

It should be remembered that not only the bricks may react with the metal, but (*Please turn to page* 83)

QUESTIONS and ANSWERS

Chill Casting of Gear Blanks Requires Experience

We are producing a considerable number of bronze sand cast gear blanks of various sizes. Chill cast gear blanks, i.e., chilled on the rims and sides have been requested for occasional pieces. Will you inform us as to the methods used, whether the chill is in one piece, and if a special iron is used? Also, what kind of wash is given the chill? The gear blanks to be cast in this manner will probably be 10 inches in diameter or larger and are made of a modified *G* metal, having 9 per cent tin.

Process of chill casting has been discussed from time to time in THE FOUNDRY and much of the data you request, you probably already have read. We will refresh your memory by giving you the following as authentic information and more or less of a digest of the available data covering this subject.

Periphery of the wheel is chilled by applying a ring chill made of cast iron. Size of the cast iron chill is governed by experience. There are those who do not believe in coating the chill at all, and others who feel that some coating prevents blows or improves the casting from some other standpoint. Many coatings are used, all of which tend to reduce the rapidity with which the heat is transferred from the metal to the chill, and consequently affect the rate of chilling.

Some use a solution of chalk and water, or lime and water, which applied to a warm chill evaporates the moisture and leaves a thin film of chalk. Others use a lamp black in solution in a thin oil, such as kerosene, which burns off when applied to the hot chill. Chills, of course, are used warm.

The important factor in these chilled cast worm gears is to gate them properly. Gating changes with each design and the thickness of blank to be cast, shape, and position of hub, if any, as well as all the other factors that influence the problem of shrinkage. All bronzes suitable for gear purposes must be fed properly by adequate risers, whether chilled or not.

One writer describes the practice of inserting ring chills in the green sand mold, placing the ring around the wooden pattern and then when the mold is completed, withdrawing the pattern and leaving the chill in the mold. Some provision must be made for warming the chills, otherwise the condensation of moisture from the wet sand will appear on the surface of the chill and cause blows.

It will be apparent that chilling adds to the cost of molding a gear blank, if it is to be done satisfactorily. To insure sound, clean, perfect castings, the chill casting process requires extra care and complicates the gating, reduces the speed at which the molds can be produced and in every way adds to the cost of production. Many foundrymen are of the opinion that chill cast worm gears can be sold at prices even below the sand castings; whereas good chill cast worm gears necessarily cost more to produce and, therefore, require an additional charge for the development of a good casting by the chill casting method.

Several Methods Are Available For Plating Plaster

We intend to experiment on depositing an electroplate of copper on a plaster cast. Can you give us any information on the subject?

Several methods are available for electroplating plaster and other nonmetallic materials. First the surface should be as clean as possible. Then it is given a coat of shellac to insure a surface impervious to the plating solution. When the shellac has dried thoroughly, it is given a coating of electrotyper's varnish or similar material which dries slowly leaving a slightly tacky surface. While the surface is still tacky, it is coated with electrotyper's plumbago using a dry camels hair brush. Copper powder can be used.

If plumbago is used, the work can be wired taking care not to scrape off the coating at the point of contact, and plated in an acid copper plating solution. The process may be speeded up by following the plumbago coating with one of iron filings, and then dipping or brushing on a solution of slightly acid blue vitriol (copper sulphate). The chemical reaction taking place between the copper sulphate and iron filings, leaves a copper film on the work which then is plated over like a regular metallic surface after rinsing in water.

Copper bronze powder, such as sold for gold gilding radiators and other surfaces, may be employed for coating the plaster after shellacking. The copper bronze coated object then is dipped into a regu-

lar silver plating solution without use of the electric current. That leaves a thin grayish colored film of silver on the surface. After rinsing in water the work is plated in an acid copper solution. The acid copper solution is made by dissolving 26 ounces of copper sulphate in 1 gallon of water. Then add slowly 3¼ ounces by volume of sulphuric acid. Dissolve 1 ounce of ground alum in a small quantity of hot water, and add to the copper solution. The solution should be used at about 70 degrees Fahr., and with still plating the voltage should be 1 volt. With agitated solutions the voltage may range from 1¼ to 1½ volts. Only pure copper anodes should be used. A good deposit may be obtained in 15 to 20 minutes.

Additions of Phosphor-Copper Depend on Many Factors

How much 15 per cent phosphor-copper should be charged to give the following analysis: Tin, 9 to 11 per cent; lead, 9 to 11 per cent, phosphorus, 0.2 to 0.4 per cent, and copper, the remainder. An open flame furnace is used and phosphor copper is added just before the metal is taken from the furnace. Scrap trolley wire is used.

In the production of standard 80-10-10 alloy with limits from 9 to 11 on the lead and tin contents and when trolley wire is being used as a source of copper, the amount of phosphor-copper would be approximately 3 pounds for every 100 pounds of charged metal. Since you melt these in an open-flame furnace we cannot give you the exact amount of phosphor-copper to be added. Some variation will be found in the amount of oxides formed and, therefore, the amount of phosphorus it will take to reduce them back to the copper will vary.

Where absolute accuracy is demanded, chemical analysis is imperative so that accuracy of control may be maintained. In other words, the laboratory is thus able to determine what the actual practice is from day to day in the particular foundry in question and thus specify the amount of phosphor-copper that will result in the phosphorus content being within the limits specified. Limits themselves are made somewhat broad since it is well known that there is no means yet discovered whereby the amount of oxides in the metal may first be determined so as to calculate the exact amount of phosphorus necessary in their reduction to metallics.

Many manufacturers of this alloy prefer to add phosphor-copper to the metal after it has been poured into the ladle or crucible in which it is carried to the mold. There are those who feel that half of the phosphor-copper should be added to the metal in the furnace and the balance in the ladle. Good practice is to add a major portion of the phosphor-copper to the metal in the furnace and add the balance in the ladle and watch the reaction. A little experience in this will soon develop a knowledge of the appearance of the metal when there is some excess phosphorus present in the alloy, which shows by the appearance of wavy lights on the surface of the bath when skimmed free of surface oxides.

Under such conditions there is definitely free phosphorus present in the alloy which upon stirring will react with any oxides in the metal or the oxygen in the air and burn and pass off as phosphorus oxide, which is a vapor at such temperatures. An excessive amount of phosphorus present in the alloy will give some trouble in causing the metal to burn into the surface of the mold or cores and, therefore, it is preferable to use just enough phosphorus definitely to deoxidize it, but not enough to have too much free phosphorus present. Therefore, it is desirable to keep below the upper limit of 0.4 per cent.

Unless 0.2 per cent minimum is demanded by the specification, 0.1 per cent is preferable to 0.2 per cent for this alloy or any similar alloys containing appreciable quantities of lead and tin. The tendency to burn into the sand and make a rough surface on the casting is reduced by keeping the free phosphorus down and just having enough phosphorus added to deoxidize with the absolute minimum left over as free phosphorus. Where the alloy contains no lead, as for example, in the standard gear metal S. A. E. 65 and some other alloys frequently used, an increase in the phosphorus above 0.2 per cent even much higher does not give quite so much trouble.

Presence of Silicon Carbide Should Improve the Iron

We are making castings with one surface covered with silicon carbide grain. Can you tell us what effect the remelting of sprues, gates, risers and scrap castings would have on our mixture? We understand that silicon carbide is being employed as a deoxidizer, but do not know if it is in the same form as the abrasive grain. We were advised that the grain does not melt or disintegrate until it reaches 2000 degrees Cent. We do not want to take any chance of producing castings with hard spots, and would rather sell these sprues, gates, etc. as scrap than incur any such risk by remelting them.

So far as we know, there is no need for you to worry about difficulties from hard spots in remelting scrap castings which are surfaced with silicon carbide. In our opinion the effect would be to give a cleaner iron. While an extremely high temperature is required to fuse or melt silicon carbide, that statement will not hold when other material, such as lime, ferrous oxide, etc. are present. Those materials combine with the silicon carbide at a much lower temperature than previously indicated, and form slag.

Incidentally, the supplier of silicon carbide as a deoxidizing agent claims that in the presence of molten iron and steel, silicon carbide is an unstable compound, and breaks down into its component parts, silicon and carbon. Those elements in the nascent state are active deoxidizers. Consequently, we believe that the addition of the scrap castings containing the silicon carbide will tend to give you a better material than without such additions.

Aluminum Bronze Is Alloy Wanted

Can you supply us with information on the mixture or formula used in casting the worm gears for Model T and 1928 Ford trucks?

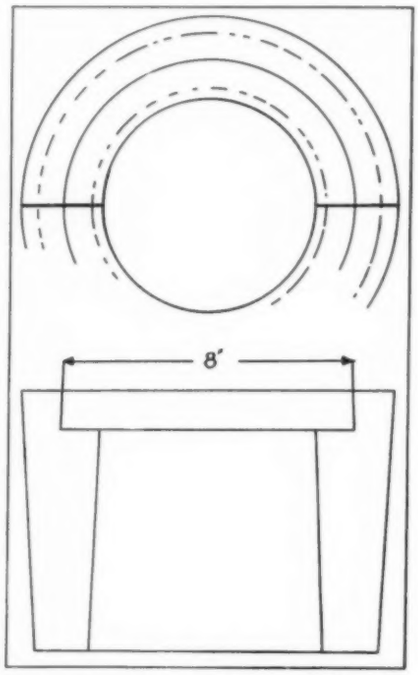
It is our understanding that worm gears for earlier models of Ford trucks and tractors, and presumably the Model T car were made of a lead-bearing aluminum bronze which was cast in metal molds. The composition of the aluminum bronze was 88 per cent copper, 10 per cent aluminum, and 2 per cent lead. The alloy showed a tensile strength of 82,000 pounds per square inch, a yield point of 30,000 pounds per square inch and an elongation of 15 per cent in 2 inches. It is our understanding, also, that to obtain a good dispersion of lead in aluminum bronze, the presence of a small amount of manganese or tin is required, say 0.1 or 0.2 per cent, and consequently, if you have difficulty from segregation of the lead, it is suggested that you try the addition of those elements.

Glass Factory Molds In Alloy Iron

We are considering the advisability of rotating the mold rapidly while pouring the metal into a casting that is used for a mold in a glass factory. The casting is approximately 7 inches high and 7 inches outside diameter with the opening in the center tapering from 1⅞-inches at the top to 2¾-inches at the bottom. We propose to pour the casting solid and machine the opening through the center. Can you recommend a suitable analysis for this casting?

In this particular instance we cannot see any advantage in rotating the mold or in pouring the casting solid. Centrifugal action will produce a denser metal on the outside than in the center, or the opposite of the result you are seeking. With certain exceptions, the center of a gray iron casting shows a larger crystalline structure, than metal on the outside, hence the use of a chill by manufacturers of these castings to close the grain on the inside.

In recent years the use of alloys has been adopted extensively in the production of glass house molds. They include straight nickel, nickel-chromium, nickel-chromium-copper, molybdenum, and nickel-chromium-aluminum-vanadium alloy irons. One contains approximately 1.50 per cent silicon, 0.60 per cent manganese, 1.50 per cent nickel, 0.60 per cent chromium and 3.30 per cent total carbon. Another contains 1.60 to 2.00 per cent silicon, 1.50 to 2.00 per cent nickel, and 2.80 to 3.00 per cent total carbon. A third alloy iron includes 14 per cent nickel, 2 per cent chromium and 7 per cent copper in addition to the usual amounts of silicon, etc., found in cast iron. A fourth contains about



Top and sectional view of split core, tapered inside and outside

3.35 per cent silicon, 0.25 per cent manganese, 2 per cent chromium, 0.75 per cent nickel, 2 per cent aluminum, and 0.25 per cent vanadium.

Service of Chemist Is Requirement

We are interested in establishing our own laboratory for analysis of carbon, silicon, phosphorus and sulphur in our iron. Can you furnish or refer us to a simplified laboratory procedure and the minimum apparatus necessary?

Generally when a plant wishes to establish a laboratory, and has not had any previous experience with the operation of such a job, it is wise to begin by hiring a chemist who has had at least a fair amount of experience in the type of work to be done in the laboratory. If one begins in this way, it is equally wise to let the chemist use his judgment as to methods and equipment.

Unfortunately, chemical analysis is both a science and an art and cannot be reduced to an infallible and simple procedure. Most routine works control laboratories determine carbon by direct combustion in oxygen and absorption of the CO_2, usually in barium hydroxide. Some laboratories weigh the barium carbonate and others titrate the excess alkali. For very fast work some laboratories measure the volume of CO_2 formed. Probably the most satisfactory method of determining silicon is by solution in perchloric acid and weighing the resulting SiO_2.

Sulphur generally is determined by evolution, absorbing the hydrogen sulphide in alkaline cadmium chloride and titrating hydrogen sulphide with either iodine or potassium iodate. The usual method of determining phosphorus is by converting it into ammonium phosphomolybdate and either weighing the *yellow precipitate* or dissolving it in alkali and titrating it with acid. Manganese is converted in most cases into permanganic acid and determined colorimetrically or by titration with sodium arsenite.

There are many text books on iron and steel analysis among which may be mentioned *The Chemical Analysis of Iron and Steel*, by Lundell, Hoffman and Bright. Having selected the methods described in a standard text book, it should be relatively simple to write out a purchase order for the necessary glassware, chemical apparatus and reagents.

Aluminum Patterns Wear Rapidly

Can you advise us on some alloy to replace No. 12 aluminum alloy in some parts of our patterns and coreboxes that wear out too rapidly, and which are quite expensive to replace. We must have an alloy which we can cast and machine and we would like to continue with a light alloy if possible. We have tried to electroplate the aluminum without success, and are wondering if we could use an alloy similar to automobile hardware, and put on a suitable electroplate.

One of the leading patternmaking firms uses an alloy composed of 92 per cent aluminum, 3 per cent silicon, and 5 per cent copper for its aluminum patterns. That alloy is made from virgin metals, melted and cast into ingots before use. The castings or patterns made from that alloy are normalized before machining by heating to a temperature of 550 degrees for 6 hours. Various points or sections of the pattern which receive the most wear are protected by steel inserts.

You mention the application of an alloy similar to that used for automobile hardware and plating it in a like manner. Such a material generally is a zinc-base alloy for die castings, and you will be back in the heavy metal class again. While you did not state what metal you tried

to electroplate upon the aluminum alloy, presumably you mean chromium. It is possible to apply chromium directly on aluminum if care is taken in the procedure. For your purpose, you will want a coating several thousandths of an inch thick to resist the wear, and the following procedure is suggested:

The first step in plating is to clean the casting in an alkaline cleaner containing from 1 to 3 ounces of sodium carbonate per gallon and 1 to 3 ounces of trisodium phosphate per gallon. That cleaner is used at 180 to 200 degrees Fahr., and after cleaning the castings are rinsed in clear cold water. Then the castings are given an acid dip in a solution containing 3 parts of nitric acid (specific gravity 1.43) and 1 part hydrofluoric acid (48 to 52 per cent). The temperature of the bath should be from 75 to 80 degrees Fahr. and the castings should be dipped from 60 to 120 seconds. Following the acid dip, the castings are rinsed carefully in clear cold water—running water if possible.

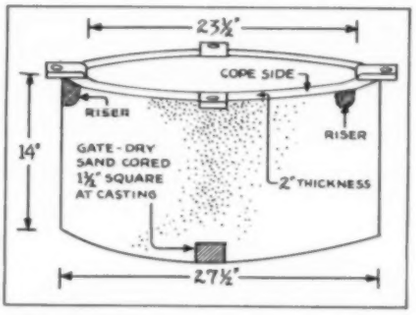
The castings now are ready for plating with chromium and the temperature of the bath should be about 140 degrees Fahr., and a current density of 375 amperes per square foot should be employed. The chromium plate obtained comes from the bath in a dull gray color, and it is advisable to polish it to a high luster with a chromium polishing compound.

Trouble Arises in Gating Method

We are enclosing a rough sketch of a large piston stock casting which has been giving trouble. As indicated in the sketch, the casting was gated from the bottom, with risers as shown. About 3 inches above the gate honeycombing begins, and extends to the top spreading to a width of about 12 inches. The remainder of the casting is solid. The mold is made of green sand except for the gate which is made up of dry sand plates. The metal mixture is comprised of approximately 350 pounds of cast steel scrap to 1000 pounds of machinery cast scrap. No pig is used. The cupola is fluxed with 25 pounds of limestone chips to every ton of iron charged. In addition we use purite according to specifications.

According to your sketch, the defective area is confined to one particular place, and that is directly above the gate. Since that is the case, it is our opinion that the cause of the trouble arises in the method of gating. In other words we believe the sprue or down gate is located too close to the mold cavity. Steam generated from the hot metal contained in the sprue is forced toward the mold cavity since it cannot escape through the flask. The steam entering the mold cavity of course causes agitation of the rising metal resulting in the honeycomb effect you mentioned.

Incidentally, we believe that the single gate you are employing is much too small for the weight of the casting. We believe that top pouring through the use of a ring of pop gates and a pouring basin will give the best results although castings similar to yours are poured with a pouring basin from which four or five pencil gates extend through the cope. Again some are poured through a central sprue extending to the bottom of the mold from which the molten metal reaches the cavity through four runners equally spaced around the circumference. Also the mold should be well vented through sufficient application of the vent wire to insure ready escape for the gases generated by the molten metal. From the holes made by the vent wire, scratches should be made of the upper surface to be sure that the gases are carried to the mold exterior.



Honeycombing in casting is relegated to an area just above the gate

To Churn or Not to Churn a Riser

My curiosity has been aroused on the subject of churning risers or gray iron castings. I have made several tests and have been unable to see where any purpose was served by churning. I shall appreciate an expression of opinion on this subject.

While undoubtedly the practice of churning or pumping risers on gray iron castings is overdone to a considerable extent, still in many instances it is a necessary and perfectly legitimate factor in the production of sound castings. In other instances where the practice may not be actually necessary, it is regarded as one of the minor factors in the molder's bag of tricks and classified under the heading "Better be sure than sorry." A thorough discussion of the subject would include almost endless ramifications.

For instance resort sometimes is had to churning the risers on a casting to prevent shrinkage, when in reality the cause of the shrinkage is a mold which yields under pressure. With a good, stiff mold no churning would be necessary. Tradition plays an important part in keeping the practice alive. Old time founders placed comparatively small risers on their castings and kept them open by pumping fresh iron into them with a rod. Steel foundrymen early discovered that a large body of metal in the riser fed the casting without any manipulation. Where the same technique is employed in iron foundries, no rod feeding is required.

Need Fast Pouring On Chilled Iron

On our chilled iron castings the surface resembles that of an orange peel, or has streaks running through it. We shall appreciate your advice on how to secure a smooth surface and still retain the hard surface on the iron.

To prevent waves, streaks and a generally wormy surface on chilled castings, the mold must be filled rapidly. Although the gating method is not to blame for all defective castings of this kind, still it is an important factor and must be adjusted to function harmoniously with the other factors, usual and unusual, connected with the production of chilled castings. In some instances part of the trouble may be due to the wash or coating placed on the face of the chill.

Assuming that in the present instance the coating does not cause any commotion, the ridges and general irregularity on the surface of the casting are due to the fact that the metal solidifies instantly when it comes into contact with the chill. The iron immediately following has to climb over a ridge only to form another ridge and so on until the entire chill surface of the mold is covered. In other words, surface tension accentuated by rapid cooling forms the ridges or waves on the surface of the casting. The obvious remedy is to pour the metal fast and hot so that the chill is covered as rapidly as possible.

In certain instances it is advisable to provide several gates instead of the usual single gate for more rapid distribution of the iron. This feature, as pointed out previously, depends to some extent on the shape of the casting. Importance of filling the mold rapidly is recognized by the makers of chilled rolls and car wheels.

R. F. Harrington

W. H. Bruckner

David B. Hill

Allen W. Morton

MEN of INDUSTRY

R. F. HARRINGTON recently was appointed foundry superintendent and chief metallurgist of Hunt-Spiller Mfg. Corp., Boston. Mr. Harrington graduated from Tufts college in 1913 with a degree of bachelor of science in chemical engineering. Since that time he has been employed by the Hunt-Spiller Corp., first as chemist and for the past 15 years as metallurgist. He was an early worker in the field of sand control and research, and has contributed many papers upon this subject to various technical organizations. He is a member and past director of the American Foundrymen's association, former president of the New England Foundrymen's association, member of the American Society for Metals and member of the American Society for Testing Materials.

A. H. LINDSAY has been appointed assistant foundry superintendent. Mr. Lindsay has been associated with the Hunt-Spiller Mfg. Corp. for 32 years. During that time he has served as a molder, molding foreman, and general foreman of foundry operations.

JOSEPH GOOSTRAY has been appointed mechanical superintendent in charge of maintenance and operation of mechanical and electrical equipment and of all departments of the company in which finished machined products are manufactured. Mr. Goostray is a graduate of the Boston Public schools and of the mechanical engineering course at Northeastern university. He has been in the employ of the Hunt-Spiller Corp. since his graduation, although he served in the United States navy as a chief petty officer during the world war.

H. E. BARBER succeeds Mr. Goostray as mechanical engineer. Mr. Barber graduated from Lowell institute in 1924, and has been associated with the corporation since that time as assistant mechanical engineer.

A. S. WRIGHT, formerly assistant metallurgist, has been appointed metallurgist. He succeeds Mr. Harrington in that capacity. Mr. Wright has been associated with the Hunt-Spiller Corp. in the chemical and metallurgical departments since his graduation from Northeastern university in 1914. He has devoted much of his time to metallurgical problems and to the development of sand control methods in the foundry.

♦ ♦ ♦

WALTER H. BRUCKNER has been appointed research associate in metallurgical engineering in the department of mining and metallurgical engineering, University of Illinois. A graduate of Columbia university, New York, and an experienced research worker, Mr. Bruckner goes to Illinois from the United States naval research laboratory, Washington, where he has been engaged in metallurgical research on iron alloys. He is a member of the American Institute of Mining and Metallurgical Engineers, the American Society for Metals, the American Electrochemical society, and the American Welding society.

♦ ♦ ♦

ALLEN W. MORTON, general manager, American Hammered Piston Ring division, Koppers Co., Pittsburgh, has been elected vice president of the company. Mr. Morton, a native of Richmond, Va., was graduated as a civil engineer from the University of Virginia in 1916. That year he was employed by the Bartlett Hayward Co., Baltimore, now a division of Koppers Co. Later he became associated with American Hammered Piston Ring division. He is a member of the Society of Automotive Engineers and the American Society of Mechanical Engineers. He served for two years on the central advisory board of the latter organization.

♦ ♦ ♦

DAVID B. HILL has been appointed sales engineer specializing in foundry equipment by the Chain Belt Co., Milwaukee. Mr. Hill, an electrical and mechanical engineering graduate of Clemson college, has spent more than 20 years in the foundry equipment industry, during which time he has been associated with the Ford Motor Co., the American

(*Continued on page* 44)

NICKEL DOES A *Sweet* JOB...

How the Ritter Company avoids rejections and cuts machining costs in intricate dental equipment.

Valve casting for distribution of water in Ritter dental equipment. Note number and size of passages, also dense and uniform structure of the Nickel alloy bronze, in cross-sectional view.

THAT smart non-ferrous foundrymen are profiting by the use of Nickel, is evidenced by many new reports. Latest of these is news of all-around improvement effected by Ritter Dental Mfg. Co., Inc., of Rochester, N. Y. in dental "cuspidor" castings of Nickel bronze.

Previously cast in common 85-5-5-5 red brass composition, this part centralizes distribution of water to flush the cuspidor bowl, operates the ejector, and supply water to the tumbler of the Ritter Dental Cuspidor. It is necessarily small and compact – weighs only 2½ lbs. – yet is honeycombed with passages.

Foundry rejections on an intricate casting of this type usually run high. In addition, shrinkage, porosity and other imperfections which show up after some machining expense has been incurred, add to machine shop costs.

By using an 85% copper, 4% tin, 5% lead, 5% zinc and 1% Nickel mixture, notable improvements resulted: the density and uniformity of structure improved so greatly that foundry rejections were reduced to a minimum and machine shop costs substantially lowered.

Consultation on casting problems involving the use of Nickel Brass and Bronze Alloys is invited.

NICKEL BRONZE CASTINGS

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

(*Continued from page* 42)

Radiator Co., and Palmer-Bee Co. His work has covered the design, manufacture, installation and sale of a variety of foundry equipment.

♦ ♦ ♦

LEO A. BEHRENDT, vice president, American Crucible Co., Shelton, Conn., has been elected president of Crucible Manufacturers association.

♦ ♦ ♦

J. N. SPENCER, formerly vice president and general manager, Hobart Mfg. Co., Troy, O., has been elected president and general manager to succeed the late H. L. JOHNSON.

♦ ♦ ♦

WALTER J. STUMPF, associated with George L. Mesker & Co., Evansville, Ind. since 1904, was elected general manager, succeeding HENRY F. KOCH.

♦ ♦ ♦

H. J. MCJUNKIN, 7800 Edgewood avenue, Swissvale, Pa. has been appointed sales representative in the Pittsburgh district for James Clark Jr. Electric Co., Louisville, Ky.

♦ ♦ ♦

GEORGE T. HUBBELL, formerly connected with the home office of the Mullite Refractories Co., Shelton, Conn., has been made district representative in Michigan.

♦ ♦ ♦

J. R. WARK, Queen City Sand & Supply Co., Buffalo, has been appointed representative of the Steelblast Abrasives Co., Cleveland, in Buffalo, Rochester and Syracuse.

♦ ♦ ♦

W. E. DERWENT, vice president, George D. Roper Corp., Rockford, Ill., has been elected a member of the board of the Association of Gas Appliance and Equipment Manufacturers.

♦ ♦ ♦

J. H. HILLMAN JR. and HENRY A. ROEMER have been elected directors of the Pittsburgh Steel Foundry Corp., Glassport, Pa., in place of Floyd W. Smith and F. A. McCune, resigned.

♦ ♦ ♦

VICTOR R. WILLOUGHBY, general mechanical engineer, American Car & Foundry Co., New York, since 1924, has been elected to the newly-created post of vice president in charge of engineering. He is succeeded by E. D. CAMPBELL.

♦ ♦ ♦

W. A. MEITER has been made manager of the Buffalo sales office, Worthington Pump & Machinery Corp., Harrison, N. J. Mr. Meiter has been a member of the Worthington organization since his graduation from Ohio State university in 1927, and has served the major portion of that time as a salesman in the Cleveland territory.

♦ ♦ ♦

JOSEPH F. FROGGETT, senior editor, *Daily Metal Trade*, was honored Feb. 3 by 120 of his home office associates at a luncheon, upon completion of his thirtieth year with the Penton Publishing Co., Cleveland, publishers of THE FOUNDRY, *Steel*, *Daily Metal Trade*, and other business and industrial papers.

E. L. Shaner, president of the company, presided, and Samuel H. Jasper, manager of the company's Pittsburgh office, who was similarly honored in September, presented a watch as a testimonial from fellow workers.

Joseph F. Froggett

Mr. Froggett began his journalistic career in 1890 as a reporter on the *Telegram* in Youngstown, O., and became managing editor of that paper. In 1906 he moved to Cleveland and became associated with the *Cleveland Plain Dealer*. He joined the Penton organization on Jan. 6, 1908, as assistant to George Smart, then editor of *Iron Trade Review*, predecessor of *Steel*. When the daily edition of the Review was started in 1909 he devoted considerable time to its editing and when this was enlarged and renamed *Daily Iron Trade Review*, he was made managing editor.

In 1925 he was appointed senior editor of Penton publications, and later senior editor of *Daily Metal Trade*, successor of *Daily Iron Trade Review*. He is well known for his regular column "Touch and Go," in which his wide knowledge of men and affairs in the iron and steel industry provides interesting sidelights suggested by day-to-day news.

♦ ♦ ♦

G. C. SMITH recently was elected president, Sterling Steel Foundry Co., Braddock, Pa., succeeding his father, the late George W. Smith. The new president has been associated with the Sterling company for many years, giving principal attention to sales work.

♦ ♦ ♦

JOHN G. SHODRON, formerly chief research engineer, James Mfg. Co., Ft. Atkinson, Wis., and his son, JOHN M. SHODRON, heretofore mechanical engineer for Caterpillar Tractor Co., Peorio, Ill., have been appointed to the faculty of the mechanical department, Marquette university, Milwaukee.

♦ ♦ ♦

PROF. HERBERT M. BOYLSTON, head of the department of metallurgy, Case School of Applied Science, Cleveland, has been granted a six-months leave of absence because of ill health and expects to leave shortly for Tuscon, Ariz. K. H. DONALDSON, professor of mineral industry, will serve as acting head of the department in his absence.

♦ ♦ ♦

DR. GERALD M. COVER, National Steel Corp., Steubenville, O., recently was named associate professor of metallurgy, Case School of Applied Science, Cleveland. Dr. Cover graduated from Case in 1924 and first was employed by the Weirton Steel Co., Steubenville, as a technical apprentice in the open hearth and rolling mill departments. Later he received a doctorate from Ohio State university, Columbus, O.

♦ ♦ ♦

WILLIAM P. LAYTHAM, president of W. P. Laytham & Sons, Paterson, N. J., recently was the guest of his two sons, William B. and W. Allison Laytham, at a dinner given in his honor to mark the fiftieth anniversary of the founding of his firm. More than 150 of his friends and business associates gathered in the ball room of the Hotel Alexander Hamilton, Paterson, to congratulate him upon the record of his company and to pay tribute to his friendship and leadership.

♦ ♦ ♦

O. F. STROMAN, since 1931 manager of the industrial sales department, Westinghouse Electric & Mfg. Co., East Pittsburgh, has been appointed assistant to the vice president in charge of sales. C. B. STAINBACK, formerly assistant manager of the industrial sales department, becomes manager. BERNARD LESTER, also a former assistant manager, has been made manager of a newly created resale department.

♦ ♦ ♦

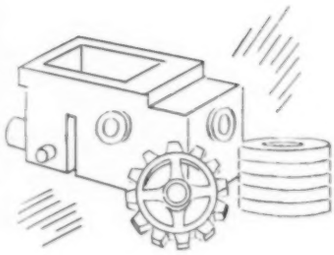
WELLES G. CATLIN, formerly an industrial co-ordinator of the co-operative training division of the International Correspondence schools, Scranton, Pa., has been ap-

(*Concluded on page* 46)

CLEAN MATERIALS THE *Modern* EFFICIENT WAY

Let a SLY BLAST ROOM do the job

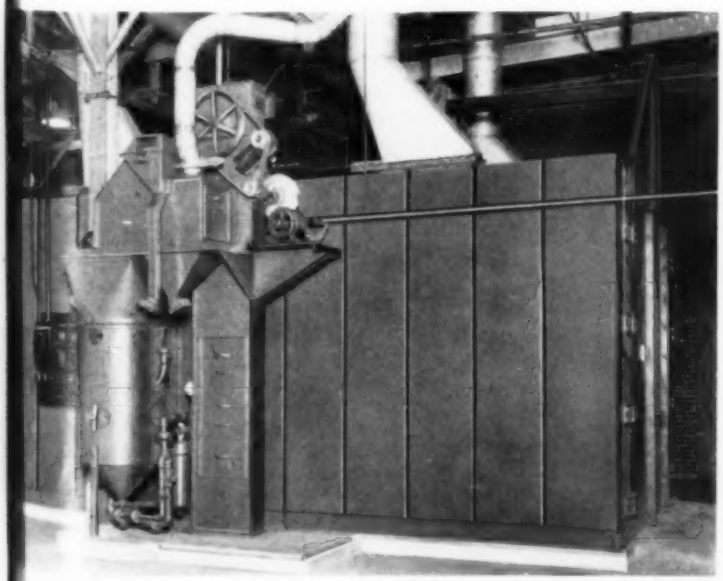
● *Interior of a Standard Sly Blast Room. Note special intake duct construction which allows unobstructed downdraft ventilation.*



For cleaning those types of castings which cannot be cleaned by other methods—a quick, efficient and economical way is found in the Sly Blast Rooms.

The sturdy construction, convenient arrangement and adaptability of the Sly Blast Room are definite reasons for Sly leadership. Sly Blast Rooms add to your profits by thorough cleaning performance at lower production cost.

Sly Blast Rooms are furnished with either intermittent or continuous Automatic Slyblast Tank with various handling accessories such as turntables, monorail, car track and car, or any combination of these accessories.



View of *Sly Blast Room showing abrasive elevator, cleaner and pressure blast tank.*

SLY BLAST ROOMS

use Sandblast, Shotblast or Gritblast

Write for Booklet S-89

THE W·W SLY

MFG·CO·CLEVELAND·OHIO

(*Concluded from page* 44)
pointed assistant director of the I.C.S. mechanical schools. He has assisted in the installation of apprentice training programs for a number of large corporations. His new duties will cover both review and development of texts and instruction services.

♦ ♦ ♦

RAMSEY THOMAS has resigned as superintendent of the South San Francisco plant, Enterprise Foundry Corp., San Francisco. Mr. Thomas was in charge of electric steel, gray iron and brass foundries of that organization. He has spent a number of years in research and experimentation with deoxidizers and catalytic agents in electric steel, and has developed a new process. He plans to devote his time to manufacture of steel castings.

♦ ♦ ♦

JOHN H. HOLZBOG, personnel director, Chain Belt Co., Milwaukee, recently received the distinguished service award of the Milwaukee Junior chamber of commerce. The award was made in recognition of services in promoting industrial safety. During 1937 he was chairman of the School for First Aid and Health, chairman of the foundry section of the Milwaukee Foremen's Safety school, president of the Milwaukee Industrial Relations association, and district commander of the Milwaukee Community Fund.

♦ ♦ ♦

DR. J. C. WARNER, associate professor of metallurgy, Carnegie Institute of Technology, Pittsburgh, has been appointed professor of chemistry and head of the department of chemistry. He will succeed DR. J. H. JAMES who retires on July 1. Dr. Warner has been a member of the Carnegie engineering faculty since 1926 and during that period he has been active in research, having published some 20 scientific and technical papers. He is the author of one textbook in chemistry and the co-author of three others.

New England To Hold Second Conference

Foundrymen in the New England district again will have the opportunity of gathering together to discuss various foundry problems at the second New England Foundry conference which will be held April 8 and 9 at the Massachusetts Institute of Technology, Cambridge, Mass. The conference is sponsored by the New England Foundrymen's association, Massachusetts Institute of Technology, and the American Foundrymen's association.

Committee in charge of arrangements for the conference includes: R. F. Harrington, Hunt-Spiller Mfg. Co., South Boston, Mass., chairman; D. L. Parker, General Electric Co., Lynn, Mass., vice chairman; Leroy Sherwin, Brown & Sharpe Mfg. Co., Providence, R. I.; H. S. Washburn, Plainville Casting Co., Plainville, Conn.; George Hutchins, Standard Foundry Co., Worcester, Mass.; Prof. J. M. Lessells, Massachusetts Institute of Technology, Cambridge, Mass.; Joseph Judge, Jenkins Bros. Inc., Bridgeport, Conn., and P. E. Pyle, Massachusetts Institute of Technology. The program as tentatively arranged is as follows:

Friday, April 8

9:00 a.m. Registration.

10:15 a.m. Opening remarks by R. F. Harrington, chairman.
Welcome by Dr. V. Bush, vice president, Massachusetts Institute of Technology.

10:30 a.m. Technical session.
Chairman: E. H. Ballard, General Electric Co., Lynn, Mass.
"Application of Dust Control Principles to Foundry Operations," by Ralph R. Meigs, Liberty Mutual Insurance Co., Boston.
Discussion by Manfred Bowditch, division of occupational hygiene, department of labor and industries, Commonwealth of Massachusetts, Boston.

12:30 p.m. Luncheon—Walker Memorial.

2:00 p.m. Technical session.
Chairman: N. L. Mochel, Westinghouse Electric & Mfg. Co., Philadelphia.
"Controlled Directional Solidification as Related to the Design of Castings," by C. W. Briggs, U. S. Naval Research laboratory, Washington.
Discussion.

4:30 Technical session.
Demonstration of Crystallization, by P. E. Kyle, department of mechanical engineering, Massachusetts Institute of Technology.

6:30 p.m. Dinner—Walker Memorial.
Speakers: Dr. Karl T. Compton, president, Massachusetts Institute of Technology.
Marshall Post, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa. and vice president of the A. F. A.

Saturday, April 9

9:00 Registration.

9:30 Technical session.
Chairman: W. G. Reichert, Singer Mfg. Co., Elizabethport, N. J.
"Sand Control in the Foundry (Sand Test Demonstration), by H. W. Dietert, Harry W. Dietert Co., Detroit.
Discussion.

12:30 p.m. Luncheon—Walker Memorial.

12:30 Round Table Luncheon.
"Training of Foundry Engineers in Technical Schools."

2:00 p.m. Technical session.
Co-chairmen: H. W. Dietert, Harry W. Dietert Co., and W. G. Reichert, Singer Mfg. Co.
"Casting Defects."

5:00 Adjournment.

The following laboratories of the institute will be open for inspection during the foundry conference: Testing materials, foundry, welding, metal working, mining and metallurgy, metallography, and x-ray.

To Hold Conference In Michigan

The program for the fifth annual sectional foundry conference, sponsored by the American Foundrymen's association in co-operation with its Detroit chapter and Michigan State college, has been completed. The meeting will be held at Michigan State college, East Lansing, Mich., April 15 and 16.

This annual foundry meeting is designed to appeal primarily to those connected with gray iron production in the automotive casting field. It brings together many leading authorities for discussions on metallurgical and foundry operating problems.

The tentative program is as follows:

Friday, April 15

9:00 a.m. Registration in engineering building.

9:30 a.m. Address of welcome, by President Shaw, Michigan State college, Lansing, Mich.

10:00 a.m. Symposium on Casting Defects—Causes and Remedies.
Chairman: V. A. Crosby, Climax Molybdenum Co., Detroit.
Vice chairman: Carl Harmon, gray iron foundry, General Motors Corp., Saginaw, Mich.
"Molding and Core Sands" (blows, swells, rat tails, seams, scabs, buckles, sand burns, cold shuts, penetration, pin holes) by Harry W. Dietert, Harry W. Dietert Inc., Detroit.

12:30 p.m. Luncheon in the Union building, with talks by Dean H. B. Dirks and Prof. Wayne L. Cockwell, Michigan State college.

2:00 p.m. Symposium on Casting Defects—Causes and Remedies
Chairman: F. J. Walls, International Nickel Co., Detroit.
Vice chairman: John Lowe, Campbell, Wyant & Cannon, Muskegon, Mich.
"Metal" (chilled edges and corners, porosity and leaky castings, shrinks, blow holes) by E. K. Smith, Electro Metallurgical Corp., Detroit, and Horace Deane, Deere & Co., Moline, Ill.
"Metal" (cracks, cold shuts, inclusions, casting breakage) by James H. Lansing, Malleable Founders society, Cleveland, Enrique Touceda, Malleable Founders society, Albany, N. Y., and H. S. Austin, Buick Motor Co., Flint, Mich.

7:00 p.m. Dinner in the Union building.
Chairman: Dean H. B. Dirks, Michigan State College.
Speaker: W. L. Rybolt, general manager, Rybolt Heater Co., Ashland, O.

Saturday, April 16

9:30 a.m. Symposium on Casting Defects—Causes and Remedies.
Chairman: R. G. McElwee, Vanadium Corp., Detroit.
Vice chairman: Glen Hamilton, Budd Wheel Co., Detroit.
"Part Played by Equipment" by Vaughn Reid, City Pattern Works, Detroit (pattern, flask); Pat Dwyer, THE FOUNDRY, Cleveland (core drying, gating); and Carl Joseph, Saginaw Malleable Iron Co., Saginaw (risers, vents, ladles-covered-skimmer, etc.)

12:30 p.m. Luncheon.

2:00 p.m. Laboratory demonstrations by the college of engineering.
Director: Dean H. B. Dirks, Michigan State college.

ADVERTISING PAGES REMOVED

Milwaukee Chapter Sets Record

Lively Discussions and Large Attendance Feature Wisconsin Regional Conference

WITH a registered attendance of nearly 400, the Wisconsin Regional Foundry conference, held at the Schroeder hotel, Milwaukee, Feb. 3 and 4, and sponsored jointly by the Milwaukee chapter of the American Foundrymen's association and the department of mining and metallurgy, college of engineering, University of Wisconsin, Madison, Wis., probably set a new record both for regional meetings and for the many areas represented. Majority of foundrymen present came from Milwaukee and other towns and cities in Wisconsin, but the list also included men from Chicago, Harvey, Ill., East St. Louis, Rockford, Indiana Harbor, Louisville, Detroit, Buffalo, New York, Cleveland, Eifort and Ironton, Ohio, and one foreign visitor from Stockton, England.

Sessions Conducted Simultaneously

With the exception of three general sessions in which all the members participated, one on the evolution of castings from the blue print stage to the finished product, one on apprenticeship training, and a third on foundry management, the program was divided into four sections dealing respectively with gray iron, malleable iron, nonferrous and steel foundry practice. Sessions on all four subjects were conducted simultaneously in adjoining rooms in the forenoon and afternoon of each day.

The first noon luncheon meeting was addressed by the athletic coach of the University of Wisconsin who pointed out the intimate and important part played by athletics in the all around development of students in high schools and later in the higher institutions of learning. At a similar luncheon on the second day the audience was highly entertained by a rapid fire, forceful and dramatic presentation of a number of subjects by a speaker introduced as a famous Italian war ace. Accent, dialect, mannerisms, whole arm gestures and an astonishing trick of lowering and elevating the eyebrows through an arc of approximately 10 degrees, created a perfect illusion, heightened to some extent by an allusion to a metal recently developed in Italy lighter than magnesium and stronger than steel. At the close of the apparently formal presentation, a casual question by the chairman stripped the pseudo captain of rank, nationality, accent and gestures, halted the eyebrows in normal position and revealed the speaker as a clever impersonator with a national reputation.

Development of the program and selection of the discussion leaders for this regional conference were taken care of by a committee of the Milwaukee chapter including co-chairmen W. J. MacNeill, Federal Malleable Co., representing the chapter, and Prof. E. R. Shorey representing the mining and metallurgical school of the University of Wisconsin; D. C. Zuege, Sivyer Steel Casting Co.; Charles I. Wesley, Wesley Steel Treating Co.; R. S. MacPherran, Allis-Chalmers Mfg. Co.; Oscar Frohman, Ampco Metals Inc.; Prof. J. F. Osterle, University of Wisconsin. Outside visitors commented freely on the smooth and efficient manner in which the program moved from stage to stage without haste or confusion and on scheduled time opening and closing.

Discussion Was Informal

The conference probably established a precedent that will find favor with similar foundry meetings in the future. No prepared papers or addresses were presented with the exception of those given at the three general sessions. At the other 18 individual sessions, discussion leaders briefly presented a topic for discussion, invited questions and comment and if necessary, when interest seemed to flag momentarily, injected new life into the proceedings. In this connection it is interesting to note that the committee was fortunate in securing discussion leaders eminently qualified for the position. Attendance at each session taxed the capacity of the meeting rooms and on many occasions two or three members simultaneously were claiming recognition from the chair. All very lively and informal with no restrictions or inhibitions if a member at times felt that the proper presentations of his views required a word or two from the ordinary or working foundry vernacular. In this free and easy atmosphere no difficulty was experienced in maintaining interest at a high pitch from the opening to the closing of each session.

A brief synopsis of the field covered in the two days shows that gray iron foundry subjects included: Cupola practice, sand control, electric cast iron, cast iron heat treatment and experiments, scrap castings, causes and remedies. On the subject of malleable iron, separate sessions were devoted to the consideration of melting, annealing, molding and core problems and scrap clinic, and sand control.

Nonferrous foundrymen at four sessions discussed sand control, brass and bronze castings, molding practice including gates and risers, aluminum alloys. In the steel foundry field discussion centered around cleaning room problems, melting, molding and casting problems, and alloy steel heat treatment and flame hardening.

Efficient Discussion Leaders

Discussion leaders in the gray iron section included: Geo. A. T. Long, Pickands, Mather & Co., Chicago; N. J. Dunbeck, Eastern Clay Products Co., Eifort, O.; Harry W. Dietert, H. W. Dietert & Co., Detroit; Garnet P. Phillips, International Harvester Co., Chicago; O. T. Muehlemeyer, Metal Treating institute, Rockford, Ill.; A. J. Busch, Charles C. Kawin Co., Chicago.

In the nonferrous sessions, discussion was conducted by H. W. Dietert, H. W. Dietert & Co., Detroit; George Klenk, Allis-Chalmers Mfg. Co., Milwaukee; and H. L. Rowe, Aluminum Company of America, Cleveland. Cleaning room problems engaged the first attention of men interested in the production of steel castings. Discussion on this feature was led by P. A. Dougher, American Steel Foundries, Indiana Harbor. Remaining sessions were led by W. Harvey Payne, Pittsburgh Lectromelt Furnace Corp., Pittsburgh; Eugene Silver, Smith Steel Foundry Co., Milwaukee; H. W. Dietert; Raymond L. Rolf, Lakeside Steel Improvement Co., Cleveland.

L. J. Wise, Chicago Malleable Casting Co., Chicago, led the discussion on malleable iron melting in the first session devoted to problems connected with that metal. He also presided over the succeeding

session devoted to annealing. Discussion in the third session embracing molding and core problems and scrap clinic was led by M. W. Gleisner, Walker Mfg. Co., Racine, Wis. At the fourth and concluding session a wide variety of questions dealing with sand control were answered by H. W. Dietert, Detroit, and N. J. Dunbeck, Eastern Clay Products Co., Eifort, O.

Appearance of Mr. Dietert on so many programs was due to the fact that he had several pieces of sand testing apparatus by which he demonstrated the action of sands under various conditions, explained the reasons underlying casting defects traceable to sand, how to test sand for various properties, including bond, permeability, green and dry strength and how to select and prepare the proper grade of sand to meet any casting condition in any of the metals usually handled commercially in the foundry, gray iron, malleable iron, steel and nonferrous prepared in almost endless ramification of combinations.

Without minimizing the importance of any individual feature, or the necessity of synchronizing all essential factors, Mr. Dietert directed particular attention to the necessity of providing a sand with the proper degree of resilience, or the ability to expand and contract without distortion. Many of the rat tails, buckles, scabs and other forms of defects on the faces of castings are caused directly by a sand perfect in other particulars, but lacking in resiliency.

At the opening session the first day, A. F. Pfeiffer, assistant general superintendent, pattern shop and foundries, Allis-Chalmers Mfg. Co., Milwaukee, presented a series of slides showing methods and equipment employed in the production of a wide variety of castings. Taking a large blower shell as an example he described in detail the evolution of the casting from the original conception in the mind of an engineer, through the conference stage between drawing office, pattern shop and foundry, selection of lumber, molding method in relation to available equipment, crane and oven capacity, probable shrinkage, cooling strains, metal mixtures, cupola operation, pouring, shaking out and cleaning the casting in a hydraulic installation in which the saving is approximately 60 per cent over the former hand cleaning cost. This session was presided over by Walter Gerlinger, president of the Milwaukee chapter who extended the official welcome and briefly outlined the scope of the program, the rooms where the various sessions were to be held and the time allotted to each session.

Walter Simon, director of education, Wisconsin Industrial commission, presided over the second general session at which Victor Hydar, in charge of apprenticeship activities at the Falk Corp., Milwaukee, explained the apprenticeship set-up as conducted by the state of Wisconsin. The system is arranged to work closely with the extension course conducted by the University of Wisconsin. G. Zabel and M. Wesolowski, circuit teachers contributed details on the methods of selecting candidates, methods of instruction, examinations and other features.

At the third and concluding general session Dan M. Avey, secretary-treasurer, American Foundrymen's association, Chicago, presented a paper dealing with many features of foundry management. This paper is presented on page 31 of this issue.

1938 Convention Will Feature Contests

American Foundrymen's association has announced that the molding and pattern making contests, features of conventions in past years, will again be held at the 1938 convention in Cleveland, May 14 to 19. The contests will be sponsored by the association committee on foundry apprentice training, and competitions will be held in steel molding, iron molding, nonferrous molding and pattern making classes. First, second and third prizes of $40, $25 and $15 will be awarded in each class. Regulations of the committee provide that local contests to determine entries for the national contest may be held under the supervision of individual foundries or foundry groups.

The apprentice training committee is composed of men who have had wide experience and who are representative of various foundry groups. Its personnel is: Chairman, V. J. Hydar, personnel director, Falk Corp., Milwaukee; S. M. Brah, International Correspondence schools, Chicago; K. P. Crowell, supervisor apprentice training, Caterpillar Tractor Co., Peoria, Ill.; Franklin Farrel III, foundry manager, Farrel-Birmingham Co., Ansonia, Conn.; C. J. Freund, dean, College of Engineering, University of Detroit, Detroit; J. G. Goldie, foundry instructor, Cleveland Trade school, Cleveland; J. E. Goss, apprentice supervisor, Brown & Sharpe Mfg. Co., Providence, R. I.; John Grennan, instructor foundry practice, University of Michigan, Ann Arbor, Mich.; J. Morgan Johnson, vocational supervisor, Tri-City Manufacturers association, Moline, Ill.; John H. Ploehn, superintendent, French & Hecht, Inc., Davenport, Iowa; B. B. Wittfoht, Caterpillar Tractor Co., Peoria, Ill.

Equipment Makers Elect Officers

H. S. Hersey, vice president, C. O. Bartlett & Snow Co., Cleveland, was elected president of the Foundry Equipment Manufacturers' association at its annual meeting held in the Cleveland hotel, Cleveland, Feb. 8. P. J. Potter, vice president, Pangborn Corp., Hagerstown, Md., was elected vice president, and Arthur J. Tuscany, Tuscany, Turner & Associates, Penton building, Cleveland, was re-elected secretary-treasurer.

The new directors elected are as follows: H. S. Simpson, National Engineering Co., Chicago; P. J. Potter, Pangborn Corp., Hagerstown, Md., and O. C. Sabin, Steel Blast Abrasive Co., Cleveland. Following reports of committees and the report of R. S. Hammond, retiring president, attention was devoted to a survey of business conditions and prospects in the equipment industry. The majority of those present indicated the belief that 1938 began at about the same level as 1936 and that the prospects are good for a gradual improvement in business conditions.

C. E. Hoyt, executive vice president of the American Foundrymen's association, and manager of exhibits, outlined briefly some of the features of the coming exhibit of foundry equipment at the A.F.A. Cleveland convention.

Following the luncheon, Lewis M. Lind, chief, machinery division, U. S. department of commerce, bureau of foreign and domestic commerce, outlined the services rendered industry by that division. He stated that export sales of foundry equipment was $2,139,000 in 1936 and $1,507,103 in 1937.

Albert E. Grover, cost consultant, Cleveland, spoke at the afternoon session on "Present Day Cost Considerations." Mr. Grover outlined some of the fundamentals which must be considered in arriving at a true cost, and stressed factors in connection with the multiplicity of taxes which now must be handled in cost determinations.

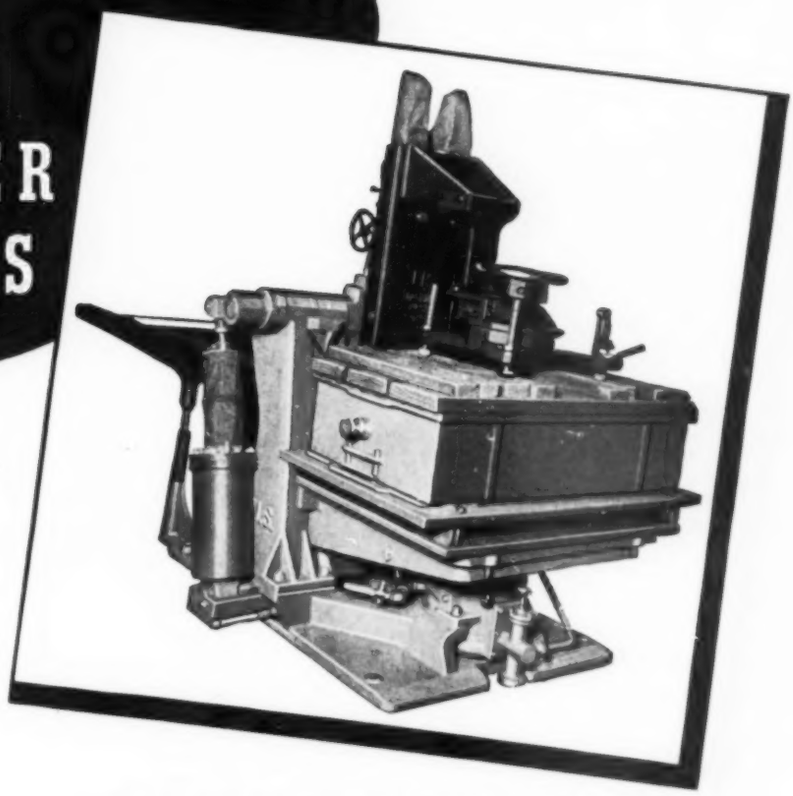
Dan M. Avey, secretary-treasurer, American Foundrymen's association, Chicago, spoke on "Progress in Safety and Hygiene." Mr. Avey outlined the work which has been done by the American Foundrymen's association in connection with hygiene and safety, and insurance.

Bureau of Mines, Washington has published a report relating to its various activities during 1937. The publication contains 37 pages and describes work conducted by various divisions and branches.

Modernize Your Foundry . . .

with these

MODERN ROLL-OVER MACHINES

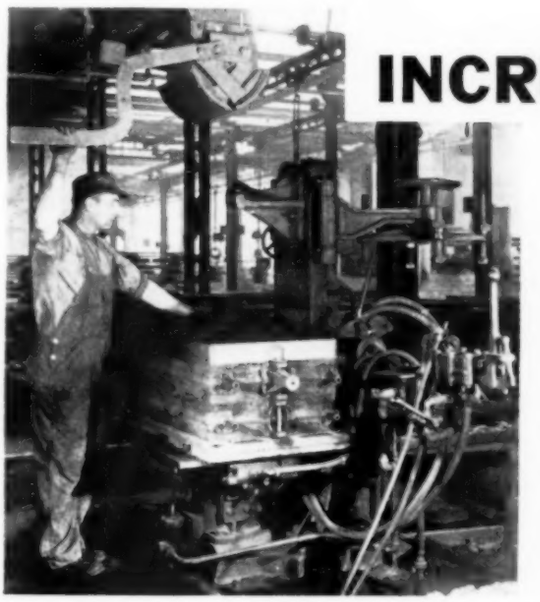


AIR – JOLT—CLAMP—LEVELER—ROLL-OVER—PATTERN DRAW

Save time and lower costs on both jobbing and high production work.

Outstanding features—adjustable mold conveyor—two reciprocally operating roll-over cylinders—dash pot control—put these machines in "must" class of foundry equipment.

Made in various sizes up to 44" x 54" table.



EASY OPERATION INCREASES PRODUCTION

- No pit required.
- Fully air operated.
- No clamps or wedges for roll-over operation.
- Mold is clamped and locked by downward stroke of the piston.
- Draw operation requires no unclamping or leveling of the bottom board.
- Flask and bottom board are always in alignment with the pattern, thus assuring a perfect draw.

Write for copy of our catalog covering complete line of U-S molding machines.

The JOHNSTON & JENNINGS *Co.*

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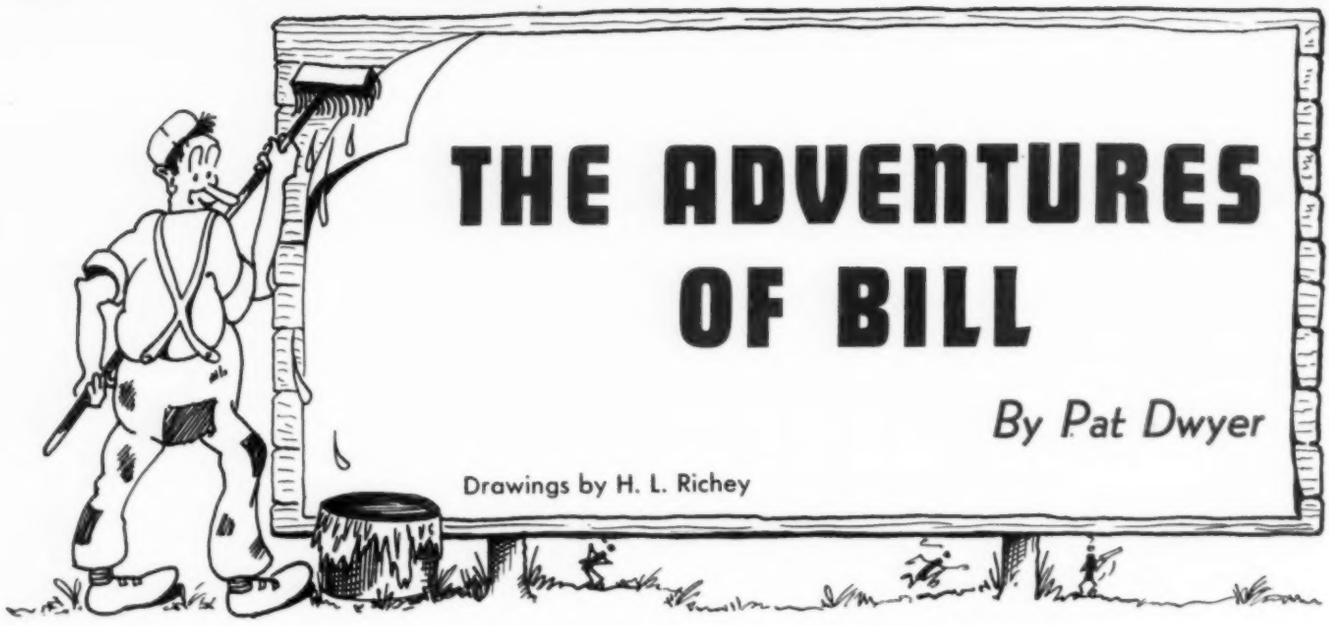


THE ADVENTURES OF BILL

By Pat Dwyer

Drawings by H. L. Richey

THE last time you were here," I said to Bill the other night, "you were all steamed up, in fact I would not be exaggerating if I said the safety valve was popping, on the subject of modern songs and singers. In your estimation the words of these songs constituted a grave prostitution of the English language, the sentiments expressed either were mawkish or just plain silly and some of the singers apparently had mistaken their vocation. Instead of standing in front of a microphone on the concert stage, they should be down in the aisles with a flash light showing the cash customers to their seats. The tortures of the inquisition were as nothing compared to the agony you suffer from some of these programs on the radio."

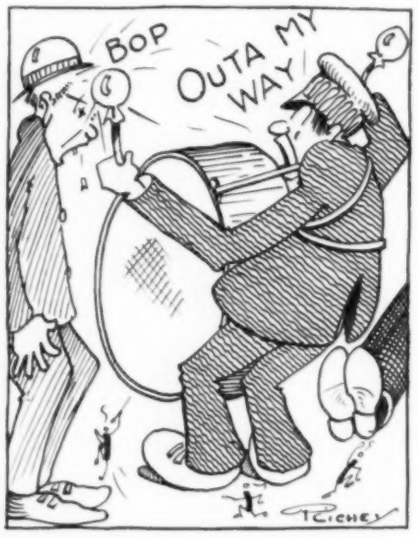
"Well," said Bill, "I'll tell you. In a general way and with the usual allowance for drift and leeway of a defective memory and a weak mind, you seem to have the general drift of the think. I regret that I can not claim credit for the flash light, the cash customers and the horrors of the inquisition, but as a happy inspiration on your part, these features are accepted with proper gratitude and will be incorporated in the minutes. With the incident thus securely signed, sealed and delivered and, as you might say, struck off the agenda, what's the idea of bringing it up again?"

"Additional evidence would seem to suggest the advisability of reopening the case. For precedent m'Lud, I only have to quote the famous incident in the annals of the Snail and Slug club, London. Discussing the current copy of *Punch*, the well known British compendium of wit and humor, one member cautiously ventured the opinion that it was not as good as it used to be. His companion, descendant of a hundred earls, high church and tory to the last drop of blood, emphatically declared that it never was!"

"So, what?"

"Why, simply, my dear lad, the present specimens of the handy man song smith's art spawned daily and nightly by the radio are neither better nor worse than those you heard 30, 40 or 50 years ago. If your memory is in good working order perhaps you recall *After the Ball*. Dash it all, here I am dragging in the same old bromide as the author. The second last line in each of the three verses, also in the chorus, ended in the word all, to rhyme with the concluding word ball in the last line."

"To be perfectly frank," Bill admitted, "I do not remember the exact words of the old favorite, but in the good old days when every person above the age of three was singing the song and every band and orchestra in the country was playing it day and night, I thought the words singularly beautiful and appropriate in setting forth a touching and romantic story of young love frustrated.



Hard to resist this type argument

"Le's see: A-a lit-tel mai-den climbed an old-man's knee. Ta ra ra ra-ra, do uncle please. Then the old uncle swings into action and tells her all about taking his dame to a dance. Everything hotsy-totsy until his girl expressed a wish for a drink of water. When he came back with the glass he saw another bird kissing the girl and immediately jumped to the conclusion that she was faithless. As a matter of fact the fella happened to be her brother, but our haughty hero would not listen to explanation of any kind. They parted and the girl died of a broken heart. The lad did not die, but the remainder of his life practically was a total loss.

"Nothing the matter with that. However, the nation wide popularity of the song was based on the music written in three-four or waltz time, the most natural and appealing of all musical movements. At that period I was playing a cornet with the New Glasgow Prospect Silver Cornet Band—the title was almost too long to paint on the perimeter of the bass drum—and while we were not offering any serious competition to John Phillip Sousa, Patrick Gilmore, or Dan Godfrey, we certainly could go to town on *After the Ball*, with or without the score.

"The boys long since have scattered far and wide and in the majority of cases I do not know whether they are living or dead. They were merry enough in the days of their golden youth, but in later years—How goes the last part of the chorus: Many a heart is aching if you could read them all. Many

(*Continued on page* 55)

(*Continued from page* 52)

the hopes that are vanished after the ball. How true!"

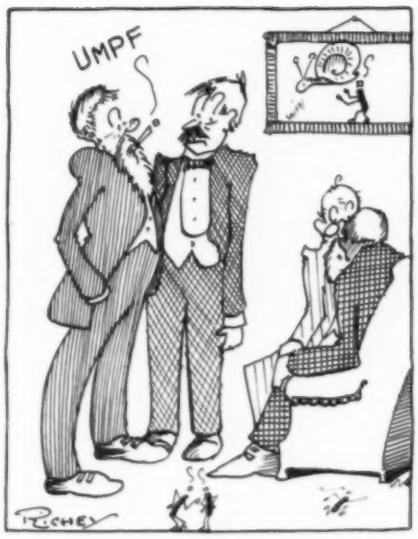
"Pardon me a moment," I said, "while I take that red herring by the tail and pitch it to where it belongs, in the barrel. I tried to point out to you that the words of the old favorite *After the Ball* were no better or worse than the words of popular modern composition. Instead of agreeing with, or more possibly combatting this claim you attempt to cloud the issue by stampeding down a side lane with a bunch of horn tooters and a big bass drum."

"A fat lot you know about stampeding. Have you ever tried to go up or down the gangway of a boat, or through the aisle of an excursion train filled with half pickled miners, molders and rolling mill crews, while carrying a tuba, a bass drum or even a snare drum? The answer, delivered in a clear, manly voice of course is No. You take my tip, young feller me lad and leave stampedes to them as knows something about 'em. Our old time bass drummer, built on the general lines of Paul Bunyan, was the only stampeder I ever knew who could stampede 'em properly. Charging like a snow plow down the gangway of an excursion steamer he pushed the mob out of his way. Those who remained on either side he playfully bopped with the drum sticks, with his feet or with a pair of long, agile and exceedingly hard elbows. In a train coach he just naturally mowed 'em down and either jammed the remains in the seats or shoved 'em through the windows."

"'Tis a great pity," I said, "that the author did not know your friend the bass drummer. He could have stuck him in his song to wit as follows: After the bull got sober, after he'd ceased to play. After he'd belted Tober-mory and crawled into the hay, 'Many a head is aching. A plague on 'em one and all. Next time' says our hero softly, 'I'll just naturally bust their gall!'"

"'Pon my word," Bill exclaimed admiringly. "I think you have something there, although it seems to me I have heard or read that plague on 'em one and all some place before. I do not remember that the gall busting clause formed part of the quotation, but the combination strikes me as a very happy inspiration for use either in local or national affairs. You might pick up a bit of change by submitting the idea to the lads behind the scenes who handle publicity and pull the strings in the next political campaign. Revive the old song *After the Ball*. With that chorus of yours tacked on to each verse it should be a knockout!"

"Any person can dash off that kind of tripe. A few weeks ago you



No argument ever changed his opinion

condemned the moronic wording and sloppy sentence construction of modern songs. While agreeing with you in the main, I attempt to direct your attention to the fact that this is not a modern development. I refer you to a sensational hit of the 90's to prove this point. As a clincher I improvise a parody on the chorus. What does it all amount to? Nothing. You ignore the original argument. You swing off on a new tack with the lee rail buried in foam and with spray from the flying cutwater drenching the top masts. A wet sheet and a flowing sea and a nostalgic harangue on the boys of the old brigade, according to your own account a bunch of rowdies addicted to strong drink and the blowing of flat notes. You find no fault with the ancient ditty *After the Ball* and finally you give your whole hearted approval to a scurrilous parody on the chorus. Have you ever heard or do you know the meaning of the word consistency?

"Sure. It is part of the title of one of the best old songs."

"An old song?"

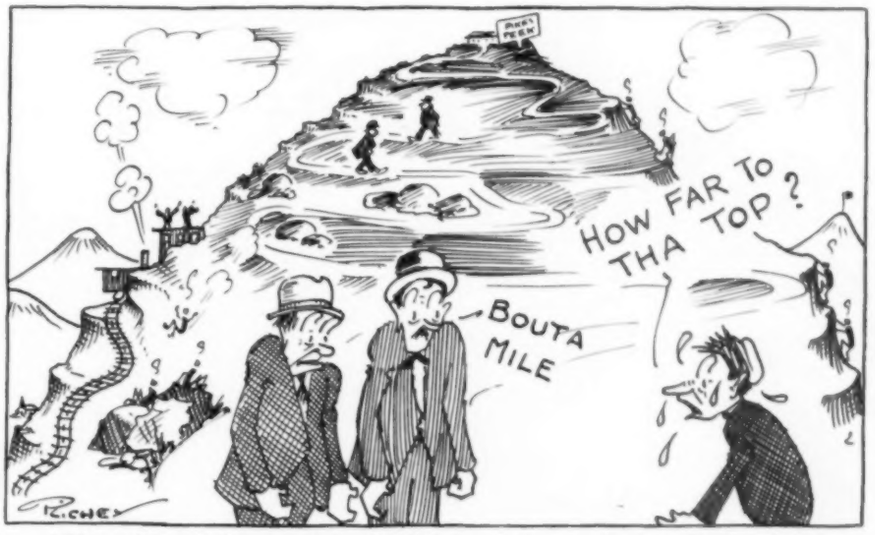
"Certainly. Played it hundreds of times. Quite a sizable bit of sniffling, eye wiping and nose blowing among older members of the audience as they visualized Aunt Dinah's quilting party and the aftermath—especially the aftermath—where the solo tenor proclaims to all and sundry that his job *consists in see*-ing Nellie home. Pretty neat, if you ask me!"

"Pretty sour if you ask me. What's the use of attempting to dissect an old song, to show up some of the weak points to a bird who hops from one twig to another and who indulges in low and questionable puns without provocation. However, since I put my hand to the plow I might just as well turn up a few furrows and expose some of the curious gems that adorned the old favorite that swept the country from coast to coast in the good old days when molders worked a 10 hour day for an honorarium of two dollars and fifty cents."

"There's something for the economical—or maybe just plain comical—birds to figure out. Forty years ago molders were paid $2.50 a day, but they worked every day and made $15.00 a week. For the past few years they were paid $7.50 a day, but they only worked two days a week and the net result was the same. Reminds me of the fella climbing Pike's Peak. At different altitudes he met travelers coming down. He asked each one how far it was to the top. Without exception each lad reported that as near as he could figure it out, the distance was about a mile. After the fifth interview the upward climber piously ejaculated 'Well, thankod, at least I am holding my own!'"

"I am beginning to think," I said, "that I am not even holding my own in the vain attempt to scale the peak

(*Concluded on page* 96)



Will remind old timers of carrying the last ladle of metal to the dog house

VIEWING Foundry Developments AT SHORT RANGE

A GERMAN engineer points out that if gray iron or alloy iron castings are designed on the basis of "design strength" rather than upon the strength of the material, the numerous advantages of the versatility of cast iron including its low notch sensitivity can be secured. With cast iron crankshafts based on design strength, and subjected to repeated torsional and transverse stresses, properties were improved considerably. Repeated torsional strengths about 25 per cent above those for similar steel crankshafts were obtained.

* * *

A flux for cleaning aluminum alloy mixtures made principally from scrap is composed of 2 parts of cryolite, 2 parts of common salt, 4 parts of potassium chloride, and 1 part of an alkali sulphate. Best results with the flux are obtained by submerging it below the surface in a suitable holder.

* * *

A composition which is claimed to give good results for molten metal pots on die casting machines contains about 3.25 *per cent carbon;* 1.90 *per cent silicon;* 0.30 *per cent phosphorus;* 0.70 *per cent manganese;* 1 *per cent nickel;* 0.40 *per cent chromium, and* 0.15 *per cent vanadium.*

* * *

A recent development is a simple method to electroplate other metals on aluminum. The aluminum article to be plated first is treated in a mild acid bath using a low current density which establishes a thin anodic film on the surface. That film is modified in an alkaline bath, and then the article is ready for plating with other metals. It is claimed that the same plating equipment, current densities, and plating times as used for ordinary electroplating can be employed.

* * *

COMPRESSED air jets directed at the knife blade contacts of a high frequency electric melting furnace have been found to save one plant about $100 a month in renewal of contacts. Dust lodging between contacts caused overheating and destruction of the temper of the copper.

* * *

Cast steel pistons made by the Ford Motor Co. are produced by a special molding system which maintains accuracy to within 0.005-inch. Molds have no internal supports, and flasks and pattern equipment are maintained to working limits as low as plus or minus 0.001-inch. Sand is packed in internal pockets by a simple mechanical method. After casting the pistons are given a heat treatment involving an initial temperature of 1650 degrees Fahr. for 1 hour; air cooling to 1200 degrees; reheating to 1400 degrees for 1 hour, and furnace cooling to 1000 degrees. That gives a brinell hardness from 207 to 241.

* * *

A suitable alloy iron for glass bottle molds containing intricate designs has the following composition: Silicon, 2.50 *per cent; manganese,* 0.70 *per cent; phosphorus,* 0.25 *per cent; total carbon,* 3.70 *per cent, and vanadium,* 0.12 *per cent.*

* * *

A Western foundry making some large driving gears weighing over 3000 pounds each, employed a 60 per cent steel scrap mixture in the cupola, and the final analysis of the iron showed 3.20 per cent total carbon, 1.90 per cent silicon, 0.80 per cent manganese, and 0.75 per cent molybdenum. An interesting feature was that 50 per cent of the silicon content was added to the ladle in the form of ferrosilicon. Coupon test bars cast with the gears showed tensile strengths of 52,000 and 57,000 pounds per square inch.

* * *

To meet demands of machinists, die makers and maintenance engineers, one firm has available stock cylindrical bars of alloy cast iron, both solid and cored, which can be machined into gears, sleeves, bearings, bushings, cams, rolls, etc. The bars range in length from 12 to 24 inches, and from 1¼ to 6¼ inches in diameter. Composition is 1.60 to 1.80 per cent silicon, 0.65 to 0.85 per cent manganese, and 1.25 to 1.50 per cent nickel. Heat treatment, quenching, and drawing improve physical properties of parts made from the bars.

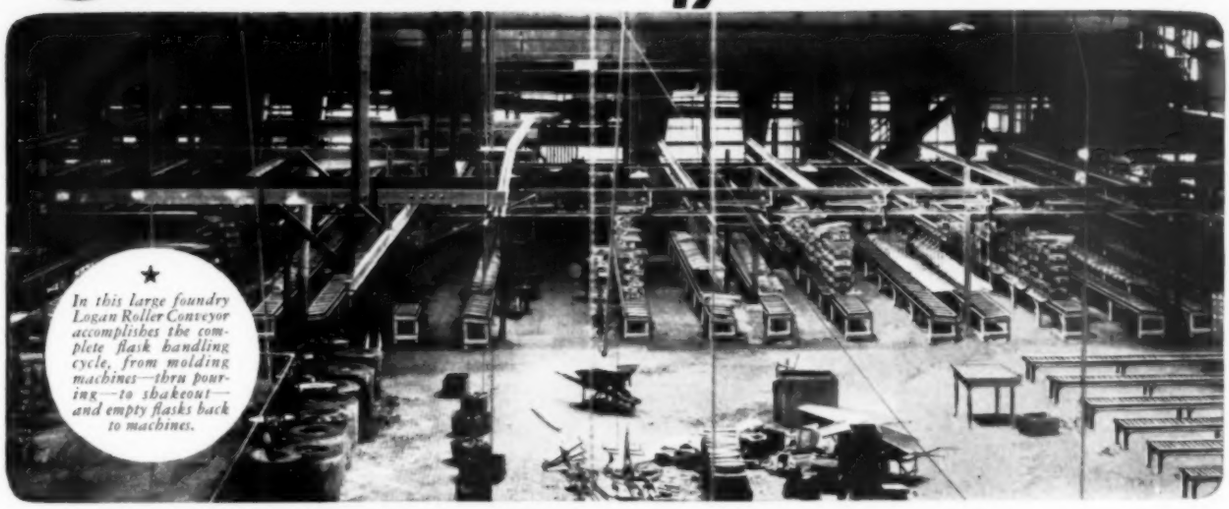
* * *

IF designers would remember that the symmetry of the human body is a perfect picture of good mechanical design, much of the foundrymen's grief would be eliminated. Man's body has gradually tapering connections between thick and thin members, and no sharp corners or very small radii where fingers, toes, etc. are joined.

* * *

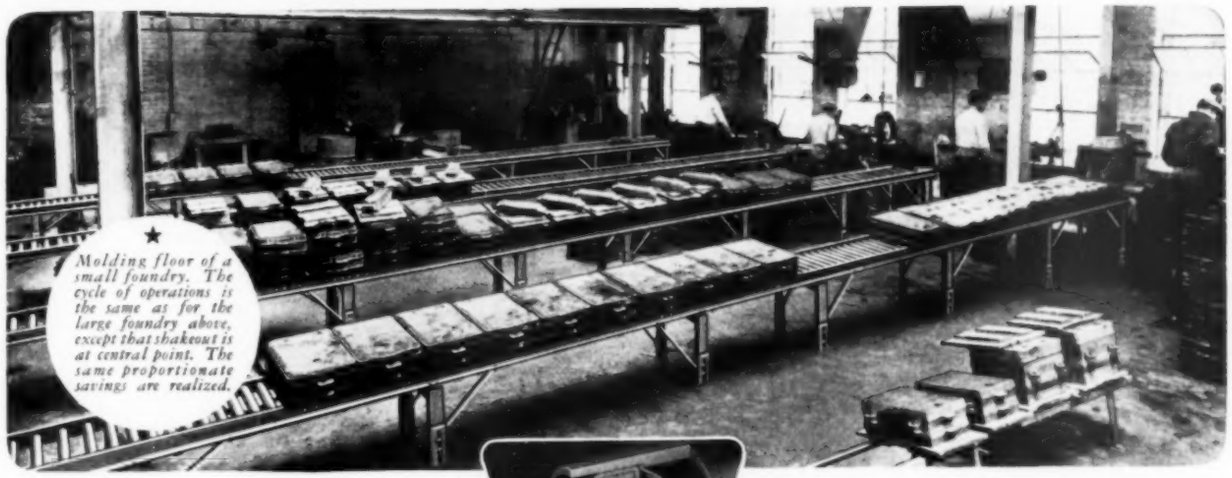
Due to an error in an item relating to grids for a rotating abrasive blast table which appeared in the February issue, credit was given to one alloy iron for the good deeds of another. The proper alloy used for the grids contained 4½ per cent nickel and 1½ per cent chromium instead of the composition mentioned, and it is noted for its wear resistant properties.

For LARGE foundries

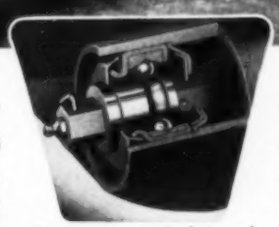


★ *In this large foundry Logan Roller Conveyor accomplishes the complete flask handling cycle, from molding machines—thru pouring—to shakeout—and empty flasks back to machines.*

and SMALL ones too!



★ *Molding floor of a small foundry. The cycle of operations is the same as for the large foundry above, except that shakeout is at central point. The same proportionate savings are realized.*



Logan Pressure-Lubricated bearing with all-steel seals. Revolves as freely as plain bearing because no felt washers.

GIANT corporation and modest establishment, have this in common—***materials movement.*** . . . Both are rightly interested in paring down costs by speedier handling, by handling with less effort, by tying all operations into one continuous flow of work from start to finish. . . . Since these things are best accomplished by well-planned conveying equipment, foundries both large and small, know and use Logan Conveyors. . . . For handling flasks through molding, pouring, cooling and storage—castings and tote pans to cleaning, grinding and machine operations, conveyors are the logical solution. There is a Logan engineer near you, or write on your letterhead for new Foundry Bulletin.

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MOVING IS 90% OF MAKING

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LOUISVILLE

FIVE DAYS OF P

• The special convention issues of THE FOUNDRY literally take the entire foundry industry to the show! Those who attend the convention personally and the thousands who read about it in the Pre- and Post-Convention issues of THE FOUNDRY can all say "we were there!"

MAY PRE-CONVENTION ISSUE

Placed in the hands of readers a full week to ten days prior to the opening of the convention, this issue will carry a complete preview of the Cleveland Show...will give foundrymen their first glimpse of their 42nd Annual Convention. Advertising forms will close April 10.

JUNE POST-CONVENTION ISSUE

Ten days after the convention closes, foundrymen will read this issue of THE FOUNDRY for the story of what happened, what was said in Cleveland. Traditional is the saying of foundrymen: "I'll get the complete story in THE FOUNDRY." Advertising forms for this issue close on May 15.

THE FOUNDRY
CLEVELAND

• MAY Saturday 14 • / MAY Monday 16 •

PROFIT-BUILDING

42nd Annual A·F·A Convention

PUBLIC AUDITORIUM • CLEVELAND, OHIO

If one word can adequately describe foundry "convention-time", that word is *profit-building.*

The foundry industry knows that its annual foundry-show is definitely an occasion for "giving and taking" in the interests of more efficient, economical production, a time when new equipment, materials and methods are revealed for inspection to a greater extent than at any other time.

Foundrymen everywhere will pay close attention to the profit-making ideas which crystallize at the 1938 Cleveland meeting —a complete and accurate report of which they will read in the two Convention issues of THE FOUNDRY.

The forthcoming Foundry Show promises to be one of the greatest, if not *the* greatest convention of all time—the MAY Pre-Convention and the JUNE Post-Convention issues of THE FOUNDRY are, indeed, advertising opportunities.

Southern California

SOUTHERN California chapter of the American Foundrymen's association held its first meeting of the year at the Masonic hall, Huntington Park, Calif., on Jan. 26. More than 80 foundrymen attended the dinner meeting at which Robert Gregg, chairman of the chapter, presided. "Advantages of Air-Weight Control" was the subject of a talk by Bruce B. Wallace, Foxboro Co.

Mr. Wallace discussed advantages, both in theory and in practice, which foundries throughout the country have discovered in the air-weight method of cupola control. A period of discussion after the speech was led by Mr. Gregg, and was devoted to questions and answers from the floor. Discussion was followed by the showing of a two-reel motion picture on "Dust Control in the foundry."—*M. S. Robb.*

New Jersey

MORE than 130 men, the largest gathering of local foundrymen in many months, heard Harry W. Dietert, H. W. Dietert Co., Detroit, speak on "Sand Control" at the Jan. 28 meeting of the New Jersey Foundrymen's association at the Downtown club, Newark, N. J. Mr. Dietert described how sand control profitably could be applied to jobbing and production foundries in both iron and nonferrous fields.

To prove that a large percentage of defective castings was caused by poor control of sand, he conducted a series of tests with equipment that had been specially installed for the meeting. A special 220 volt power installation made it possible for him to operate equipment which would demonstrate behavior of sand at high temperatures. He also made tests for determining such properties as moisture, permeability and green and dry strength, using in some cases sand samples which local foundrymen had brought to the meeting. His speech was followed by an active open discussion of sand problems in local foundries. —*B. K. Price.*

Connecticut

CONNECTICUT Nonferrous Foundrymen's association held its regular monthly meeting in New Haven, Conn., Jan. 18. After a dinner at the Hotel Duncan, which was presided over by H. A. Phelps, Phelps Foundry Co., Ansonia, Conn., and president of the chapter, the group adjourned to the Mason laboratory, Yale university, where a joint session was held with the New Haven section, American Society of Mechanical Engineers.

Subject of the joint meeting was "Casting Design and Alloy Specification." George R. Holmes, McLagon Foundry Co., New Haven, represented the engineers and explained their problems in pattern or casting design. F. B. Diana, Whipple & Choate Co., Bridgeport, Conn., presented the problems of the foundryman in casting the engineer's design. He asked that designers consider the difficulties of casting, and that they do away with uneven sections whenever possible. It was generally agreed that closer co-operation between engineers and foundrymen would result in more efficient production and better castings.—*Louis G. Tarantino.*

Detroit

DETROIT chapter of the American Foundrymen's association held its regular monthly meeting at the Fort Shelby hotel, Jan. 20. Ninety members and guests were present at the dinner, and approximately 110 men attended the meeting. Motion pictures of the quarrying and preparation of various grades of silica sand were shown by the Industrial Silica Corp., Youngstown, O., after the dinner.

Dan M. Avey, secretary and treasurer of the national office of the American Foundrymen's association, was introduced and spoke briefly, bringing greetings from the headquarters of the national society, and praising the work which the Detroit group is doing. He pointed to the fact that Detroit for many years has been considered the hub of many of the most important developments in the foundry industry.

Speaker of the evening was L. P. Robinson, sales manager, Werner G. Smith Co., Cleveland, who presented a forceful and at the same time highly entertaining discussion of the many phases of coremaking. To stimulate discussion from his listeners, Mr. Robinson divided his address into sections, each dealing with a certain part of the process of coremaking and with the numerous variables which arise in practice. In each case he cited specific examples of malpractice which he had encountered in his years of traveling through foundries from one end of the country to the other.

For instance, speaking on ovens for corebaking, he told of the occasion in a certain foundry when he inquired of a negro operator as to what temperature was being held in the oven. The negro sauntered over to the oven, placed his hand on the sidewall, thought a minute, and said, "Boss, we got about 415 degrees."

Selection of core sands; use of binders, including cereal binders; construction of baking ovens; operation of ovens; temperature control, were included among the various subjects covered by Mr. Robinson. He pleaded for increased vigilance in recognizing and controlling the many variables which are bound to be present in coreroom practice.

Considerable discussion was evoked by Mr. Robinson's mention of the troubles which a certain

(*Continued on page* 62)

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foundry was experiencing in eliminating the occurrence of small fins or "alligator" lines on steel castings, in spite of every effort to produce cores which before casting appeared to be entirely sound and perfectly smooth. Explanation for the difficulty seemed to be that the high temperature of the metal caused the core to expand and open up small cracks in its surface, thus permitting the metal to creep in and produce the small fins. These fins did not impair the resulting casting, but entailed extra labor in removing them.

One foundry superintendent suggested the use of powdered asbestos in the core sand mixture as a means of circumventing the difficulty. Other suggestions involved the use of different grades of sand, and changes in the proportion of binder to sand.—*A. H. Allen.*

Northern California

NORTHERN California chapter of the American Foundrymen's association and the Golden Gate chapter of the American Society for Metals held their first joint meeting at the Engineers' club, San Francisco, Jan. 17. More than 150 men attended the dinner meeting, during which officers of both groups were introduced. E. M. Welch, American Manganese Steel Co., announced that the Stanford school of medicine, San Francisco, has proposed an institute for the study and control of occupational health hazards. The proposal was sponsored by President Ray Lyman Wilbur and L. R. Chandler, dean of the Stanford school of medicine.

Technical session of the meeting was opened by William W. Kerlin, metallurgist, Meehanite Corp., Pittsburgh, who read a paper on "The Design of Castings." Comments on the speaker's subject were made by Captain E. D. Almy, engineering officer, USN, and by John D. Fenstermacher, Columbia Steel Co.—*George L. Kennard.*

Milwaukee

MILWAUKEE chapter of the American Foundrymen's association held its regular monthly meeting at the Schroeder hotel, Milwaukee, Jan. 21. Walter Gerlinger, Walter Gerlinger, Inc., and chairman of the chapter, presided. An extensive report was given on the vocational guidance program that opened in all vocational schools in Wisconsin last month.

The evening's program had been prepared by the silicosis committee, of which W. J. Grede, Liberty Foundry Co., is chairman. A discussion of the physical standard requirements for credit on compensation insurance rates was opened with a speech by I. G. Strauss, insurance counselor, Strauss, Swartout, Zahn & Co. B. E. Kuechle gave a short talk on insurance rates. Dr. Norbert Enzer and Dr. M. H. Seevers, directors of medical research, Dust Hazard committee of Wisconsin, made complete reports and opened a discussion of silicosis. —*Walter Gerlinger.*

Chicago

DISCUSSIONS of core room practice attracted an audience of more than 150 to the monthly meeting of the Chicago chapter, American Foundrymen's association, held Feb. 14. J. A. Gitzen, Delta Oil Products Co., Milwaukee, gave the principal talk on the subject of "Core Oils, Specifications and Testing."

Mr. Gitzen described briefly the method of manufacturing core oil and pointed out the effect of the various ingredients — drying oil, kerosene and resin—on the finished core. He recommended that foundries make a practice of testing their core oils and of purchasing them according to specifications. The various specifications to be considered include: Gravity, acid content, saponification number, iodine number, viscosity, flash and fire test, color and Griffin test.

Mr. Gitzen pointed out that while the Griffin test determines the amount of fish oil present in the product, that improved methods of collecting fish oil have removed many of the objections to this product that were present a number of years ago. Fish oil now has good qualities generally as a drying oil, but does not absorb oxygen as well as linseed oil. It is also less emulsifiable than linseed oil.

The speaker stated that while foundries are careful in their analysis and knowledge of the qualities of most raw materials employed in the production of castings, that frequently little is known about the core oil that is used. He indicated that while testing of core oil and the buying of it according to specifications is not a cure-all for troubles encountered in the core room, it is important to follow such practice.

Following Mr. Gitzen's talk brief discussions on core room practice were presented by speakers covering various branches of the foundry industry. J. M. Murray, core room foreman, Continental Roll & Steel Foundry Co. talked for the steel foundry group. Among recommended practices he suggested the adherence to specifications for sand; the use of binders suitable to the size of the core section; the thorough drying of cores, and the use of as few rods as possible.

Quality of material used in the core room is as important as that

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J. T. Hepburn
John T. Hepburn Ltd., Toronto, Ont., and a director of the Canadian section

A. E. Hageboeck
Frank Foundries Corp., Moline, Ill., and a director of the Quad City chapter

J. D. Stoddard
Detroit Testing Laboratory, Detroit, and a director of the Detroit chapter

Sam Tour
Lucius Pitkin Inc., New York, and a director of the Metropolitan chapter

ADVERTISING PAGES REMOVED

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of materials used elsewhere in the foundry, it was stated by A. Weston, Chicago Hardware Foundry Co. He recommended that cores be well vented and dried, pointing out that while cereal binder speeds the baking of cores, the cereal should be kept in dry storage to avoid moisture absorption.

B. C. Yearley, National Malleable & Steel Castings Co., stated that the core room problems of the malleable foundry are somewhat unique in that this type of plant usually requires small cores, frequently of complicated sections. Such cores consequently require skill in making. Malleable foundry cores require good venting and generally must collapse quickly upon solidification of the metal. Average tensile strength of cores used is around 160 pounds. When using sharp sand he recommended that no less than 50 per cent drying oil be used in the core oil binder.—*W. G. Gude.*

Pittsburgh

ACCIDENT prevention in the foundry was the subject of the first 1938 meeting of the Pittsburgh Foundrymen's association, Jan. 17. In a speech before approximately 100 members of the chapter, I. A. Brinkman, personnel director, Mackintosh-Hemphill Co., Pittsburgh, emphasized the increased need for all industry in the state of Pennsylvania to make more stringent safety regulations and see that they are adhered to at all times. It is possible, he said, for a single fatality to cost a concern as high as $25,000, and cases of total disability may be even more expensive.

Cost of industrial accidents to foundry operators has been increased approximately 80 per cent under the new workmen's compensation legislation in Pennsylvania which took effect Jan. 1, 1938. General raises in the schedule of accident payments, as well as a complete upward revision in the length of time payments, have been responsible for higher costs. This naturally has caused a substantial rise in insurance rates. For example, brass foundry costs have risen from $1.50 to $3.10 per $100 payroll, with similar increases in other types of foundries.

The new act, according to Mr. Brinkman, carries an industrial disease supplement which provides a sliding scale of costs to be shared between industry and the state. However, all costs must be assumed by industry, which has the responsibility of collecting from the state its share.

The key to avoiding heavy penalties under the new act, said Mr. Brinkman, is a safety program which is adhered to as rigidly as a production program. Dividends from such a program are double, for an increase in safety usually means an increase in efficiency. Workmen must be made safety conscious and must be made to realize that violation of safety rules will result in their dismissal.

In the safety program, the vital link is the supervisor, since it is with him that the morale and the discipline of the men rest. His is the responsibility of making a well-planned program work, and it is up to him to secure the proper attitude on the part of the workers. He must see that good housekeeping is instituted and maintained in the interests of safety and good production.

To further reduce the costs of the safety program, declared Mr. Brinkman, care must be taken in the hiring and placement of employes. He recommended the x-ray inspection of both new and old employes for traces of silicosis. Although it has not yet been established that x-ray plates can show definitely the extent of silicosis, there is no doubt that they can indicate possibilities of trouble. Infected men should be transferred to less hazardous positions.

A definite record should be kept of all time lost in accidents in order to single out the *repeaters*, if any, and eliminate them on the basis of inefficiency. The discussion which followed Mr. Brinkman's speech revealed that this had been done in some plants with the approval of labor unions.

The Jan. 17 meeting was the first of the new year, and the first since the chapter's annual Christmas party which was held Dec. 16 at the William Penn hotel. More than 600 members and friends attended the party, and foundrymen from Youngstown, O., and Erie, Pa., joined in the celebration.—*R. L. Hartford.*

Northern Illinois

JANUARY meeting of the Northern Illinois foundrymen's association was held Jan. 11 at the Hotel Faust, Rockford, Ill. H. J. Rowe, Aluminum Corp. of America, Cleveland, spoke on "Aluminum and Reasons for Using It."

Mr. Rowe pointed out that in 1886, aluminum was a comparatively rare metal which sold for $545 per pound. Today the price is about 20 cents. The price has fallen, not because new deposits have been discovered, but because methods of refining the metal have been developed. With lower prices, new uses for aluminum have been discovered. Its resistance to corrosion, its electrical and thermal conductivity, and its strength per unit weight have recommended it for countless commercial and industrial applications.

Mr. Rowe said that the strength of aluminum castings often could be increased 50 per cent by different gating. He recommended the use of approximately two pounds of risers to one of castings, and said that melting and pouring temperatures should be kept as low as possible.

February meeting of the chapter was held at the Hotel Faust, Rockford, Ill., on Feb. 8. C. M. Dale, Liberty Foundries, Rockford, Ill., presided.

A. F. Pfeiffer, Allis Chalmers Co., Milwaukee, spoke on "The Relation of a Casting to Other Departments." He outlined the process by which most castings are made, beginning with the drawing and going through molding, core making, melting, cleaning, etc. With stereopticon slides he illustrated each step in the preparation and making of molds, cores, and finished castings. The production of large blower castings was discussed in some detail.—*Lawrence Perry.*

Quad City

QUAD CITY chapter of the American Foundrymen's association met in joint meeting with the American Society for Metals, Feb. 8, in the Rock Island arsenal cafeteria, Rock Island, Ill. Approximately 100 men attended the meeting, over which P. T. Bancroft, Moline, Ill., presided.

"Fundamentals and Applications of Metal Testing" was the subject of a speech by Harry L. Daasch, associate professor of mechanical engineering, Iowa State college, Ames, Iowa. "A test," he said, "is defined by the dictionary as the subjection to conditions that disclose the true character of a person or thing in relation to some particular quality." Metals are subjected to various chemical, metallographic, and mechanical conditions that disclose their character in relation to specific performance.

Speaking of chemical tests, Mr. Daasch explained that the accuracy of chemical analyses varies with methods and materials. They are rarely complete, for they usually report only those elements which are thought to be most important. He urged care, cleanliness, and careful sampling in chemical tests.

Metallographic tests may be made by either macroscopic, microscopic, or x-ray examination. Study of metal fracture by simple eye observation may lead to valuable information. Chill tests for cast iron, porosity examinations, and examinations of fiber structure are macroscopic tests which are considered reliable under standard conditions. Use of a microscope implies special preparation of the sample by polishing and etching. Study leads to ac-

curate information on grain size, type, and distribution of metal constituents, inclusions, and segregations. X-ray inspections are used to establish uniformity and study crystallographic structure.

Many mechanical tests have been developed and standardized. Mr. Daasch explained the conduct and use of strength, ductility, and hardness tests and discussed the development of wear, damping, notch sensitivity, and machineability tests. His talk was followed by a brief period devoted to questions and discussion.—*J. Morgan Johnson.*

Buffalo

MORE than 60 men attended the regular monthly meeting of the Buffalo chapter of the American Foundrymen's association held in King Arthur's restaurant, Buffalo, on Feb. 7. Theodore H. D. Burke, Otis Elevator Co., Buffalo, and chairman of the chapter, presided.

A. V. Leun, refractory engineer. Bethlehem Steel Co., Bethlehem, Pa., presented an illustrated talk on insulating fire brick. His speech was followed by a lively discussion of refractory problems. Fred G. Metzger and Harold G. Leibold, Cleveland Quarries Co., Cleveland, showed motion pictures which illustrated the production and use of silica firestone.—*J. R. Wark.*

Northeastern Ohio

OVER 300 attended the first joint meeting sponsored by the Northeastern Ohio chapter of the American Foundrymen's association and the Cleveland chapter of the American Society for Metals. The meeting was held at the Cleveland club, Cleveland, on Feb. 7. Gordon T. Williams, Cleveland Tractor Co., and chairman of the local group of A.S.M. presided at the dinner, and introduced Dan M. Avey, secretary-treasurer of A.F.A., and officers of both local groups.

Alfred L. Boegehold, head of metallurgical department, Research institute, General Motors Corp., Detroit, spoke on alloy cast iron, and prefaced his discussion by defining alloy cast iron as one which contains sufficient alloying agent to have a measurable effect upon the section which will be used. He then pointed out that the physical properties of cast irons depend largely upon their microstructures, and that iron carbide and silicon are the most important constituents affecting the microstructure.

By proper control of silicon content and cooling rate of cast iron various structural types ranging from white iron through mottled and pearlitic irons to soft ferritic irons are formed. However, in many instances, particularly where there is considerable variation in section thickness, control of the silicon does not suffice to provide the desired structure uniformly throughout the casting, and various alloying agents are employed to secure uniform structure and its accompanying uniform physical properties.

Mr. Boegehold then discussed the effects of various alloys such as nickel, chromium, molybdenum, copper, titanium, and zirconium which he illustrated with numerous lantern slides of graphs, tables and micrographs. Choice of alloy or combination of alloys will depend upon results desired. He also pointed out that in the past too much reliance has been placed upon test bar results, and said that what we really are interested in is the results in the castings. Consequently, more data should be secured from tests performed upon the castings themselves.—*Edwin Bremer.*

Philadelphia

MORE than 200 members and guests attended the regular monthly meeting of the Metropolitan Philadelphia chapter of the American Foundrymen's association held at the Engineers club, Philadelphia, Jan. 14. Speaker of the evening, Dr. D. M. Curry, development and research engineer, International Nickel Co., Inc., was introduced by Dr. G. M. Clamer, president, Ajax Metal Co. The meeting was known as Ajax night.

Dr. Curry spoke on "Nickel and White Metal Alloys." The first use of an alloy containing nickel was by prehistoric man, who fabricated supposedly supernatural weapons from meteorites which contained from 3 to 25 per cent nickel. The name *nickel* was not given to the metal until the fourteenth century. Saxon copper miners, who had found the ore refractory to all efforts to refine it, named it "Old Nick's Copper." At least a part of the name was retained, although the metal is now useful and commonly used.

White metals, Dr. Curry said, are alloys of copper, nickel, and zinc, with nickel in 5 to 30 per cent. Although they were first known in China under the name *packfong*, or white copper, and later as German silver, there are now more than 200 alloys under various trade names. Nickel silver, the name now generally adopted, is sold in several grades, chiefly as a substitute for silver in plated ware and ornamental stampings. Other nickel alloys are used for modern metal tube furniture, table appointments, and hospital plumbing. A special cheap nickel silver, containing 1.5 per cent iron which imparts hardness is used for small parts, instruments, and keys. Low lead and zinc nickel silvers are used in food processing. Special alloys are used for equipment exposed to milk, sauerkraut and tomato juices. Recently, colored metals have been cast by varying the copper, nickel and zinc content.

Successful casting of nickel silvers requires care and pure raw materials of the proper composition, Dr. Curry explained. Rapid melting under slightly oxidizing conditions, in either electric, oil or gas fired furnaces; a suitable deoxidizer; a sufficiently high pouring temperature; rapid filling of the molds without turbulence; ample gates and risers; open sands; and thorough venting of molds and cores are requisites of a successful casting practice.

Consumption of nickel in bronze foundries has increased more than 300 per cent in the last few years. It is usually added to bronze for pressure tightness, reduction of leaks, improvement of physical properties, and as a substitute for the more expensive tin. Dr. Curry used slides to illustrate the effects of varying quantities of nickel in the more common bronze alloys.

More than 300 men, a record attendance, were present at the joint meeting of the Philadelphia chapter of the A. F. A. and Reading Foundrymen's association held at the Engineer's club, Philadelphia, Feb. 11. H. L. Henszey, Carborundum Co., Philadelphia, and chairman of the Philadelphia chapter, was assisted by Lee W. Harris, Link Belt Co., Philadelphia, who served as guest chairman of the dinner meeting, and Dr. G. H. Clamer, Ajax Metals Co., Philadelphia, who served as guest chairman of the technical meeting.

Speaker at the dinner meeting was Henry Butler Allen, Franklin institute, Philadelphia, who told how the institute was formed, traced its activities of the past 114 years, and outlined its present services to society.

Marshall Post, vice president and works manager, Birdsboro Foundry & Machine Co., Birdsboro, Pa., and vice president of the American Foundrymen's association, spoke at the technical meeting on "The Randupson Cement Mold Process" which originated in France. After a short history of the iron industry in the vicinity of Birdsboro, Mr. Post discussed the advantages and disadvantages of dry sand molding. He then showed how cement, as a bond, better served the present day requirements of cleaner, sounder castings.

Mr. Post said that the cement mold process had been introduced into his plant at Birdsboro, Pa., two years ago. At the present time the process is being used in gray iron

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and bronze foundries as well as in steel foundries. Although it is in no sense a sure cure-all for foundry troubles, intelligent use of the process is said to permit foundries to produce high quality castings at lower costs.

Flasks and mold drying ovens are unnecessary in foundries using the process. Mr. Post said that in his own foundry at Birdsboro about $100,000 worth of flasks have been discarded. Their salvage value, as well as the savings from the elimination of the need for new flasks, and the value of the labor saved by the new process are of considerable importance. Mold drying ovens at Birdsboro have been torn down, eliminating the cost of drying molds. Use of the floor area formerly occupied with mold drying has given sufficient working area to increase production 25 per cent. Pattern costs have been cut by the use of the process, for in symmetrical castings a one-half, one-fourth or one-eighth pattern suffices to build the whole job.

Basis of the molding process is the use of silica sand bonded with 8 to 12 per cent cement and tempered with 6¼ per cent water. Instead of drawing the pattern from the mold, the molder draws segments of the mold away from the pattern. Mold segments are allowed to stand on plates for 10 to 15 hours before stacking to complete the drying process. Molds air-dry for 24 to 72 hours before they are assembled for pouring.

Molds are not nailed. In silica sand, dry sand molds it costs about 51 cents per ton of castings for nails, and 50 to 70 cents for labor. With the cement mold process this is entirely eliminated. Gaggers and flask reinforcements are not used. An air dried cement mold is claimed to maintain dimensional accuracy. Mr. Post cited one instance in which a casting made in the old molding process required 5 hours machining time. Made by the new process, it now requires no machining.

Cement mold castings are sounder. One customer, Mr. Post said, was concerned over the increased weight of castings. A check of the dimensions showed that the casting conformed to the blueprint. One casting which required 165,000 pounds to pour and weighed 121,000 pounds was poured into a cement mold above the floor line without a flask. Although Mr. Post did not recommend this as good practice, it showed what has been done with cement molds. The sand of this mold was about 12 inches thick.

Facing sand must be used within two hours after mixing. In steel foundries molds are destroyed after pouring one casting, but in gray iron shops some molds are used to pour several castings. Permeability of cement molds in the steel foundry is about five times that of the same molds as they were formerly made. A cement mold generates very little gas or steam.

In production gray iron foundries making small castings it is estimated that costs are lowered 10 to 15 per cent, while in the large jobbing foundries savings range from $6 to $8 per ton when the cement mold process is used. In large steel foundries savings are about $10 per ton of castings.

Elimination of the drying process, of drying ovens, flasks, flask storage, flask handling labor, nailing, gaggers, arbors and reinforcements, and the savings in pattern labor, have effected these substantial reductions in foundry costs. At the same time, Mr. Post declared, new customers of the Birdsboro company have discovered that the new process produces castings of better physical properties and greater accuracy in dimensions. His speech was illustrated with stereopticon slides and motion pictures, and was followed by an active and interested discussion.—*J. T. Fegley.*

Birmingham

REGULAR monthly meeting of the Birmingham District chapter of the American Foundrymen's association was held Jan. 21 at the Tutwiler hotel, Birmingham, Ala. Dinner was served to 71 members. After the dinner, the group adjourned to the ball room to hear the guest speaker, R. C. Good, Electro Metallurgical Corp., Pittsburgh. More than 110 members and guests attended the meeting, at which Chairman R. R. Deas Jr. presided.

Mr. Good, who was introduced by James T. McKenzie, chief metallurgist, American Cast Iron Pipe Co., described the effects of the common alloying elements on cast iron, singly and in combination. He gave figures showing the changes in tensile strength, brinell hardness, deflection impact and resistance to scaling, growth and wear caused by varying percentages in alloys. Although he spoke briefly of nickel, copper and molybdenum, he gave a detailed description of certain effects of chromium additions.

Chromium, he said, is a great aid in relieving cast iron of localized eutectic graphite. Better physical properties in chrome-bearing cast iron may be obtained by melting at a lower silicon content than desired in the final product, and later adding ferrosilicon to the ladle. This ferrosilicon should be of the highest silicon content available. Mr. Good also spoke of the beneficial effect of chromium in step-bar tests. Most useful range for chromium additions he set at between 0.30 and 0.75 per cent. His lecture was illustrated with lantern slides of micrographs and charts.—*R. C. Harrel.*

Foundrymen To Meet In Kansas City

St. Louis chapter of the American Foundrymen's association has scheduled a tour meeting of the chapter in Kansas City, Mo., to which will be invited foundrymen of the Southwestern area as well as association members. The meeting will be held at the President hotel, Kansas City, Mo., at 6:30 p. m. March 25.

A program of broad interest has been prepared. Speakers will be J. S. Vanick, International Nickel Co., New York, who will present a paper on alloy cast iron and cupola practice governing the production of alloy castings, and C. R. Culling, vice president, Carondelet Foundry Co., St. Louis, who will present an address on the application of a foundry cost system. Opportunity will be given for discussion and questions.

Arrangements for the meeting are being made by Louis J. Desparois, Pickands, Mather & Co., chairman of the program committee of the St. Louis chapter; and R. O. Flanders, Blue Valley Foundry Co., Kansas City.

Milwaukee Groups Sponsor Classes

A vocational guidance course for those interested in foundry practices was started Feb. 1 under the auspices of the various vocational schools of Wisconsin and the Milwaukee chapter of the American Foundrymen's association. The course will extend over a nine month period of the year and is expected to run 2 or 3 years. Evening classes will be held weekly in the various vocational schools, covering a course of training for malleable gray iron, steel and nonferrous foundrymen. The course will deal with the elementary work in the foundry, melting practices, sand control, molding, blue print reading, heating treatments and other subjects.

In Milwaukee the classes will be held each Wednesday evening at the Milwaukee Vocational school. The nonferrous division will be under the supervision of William Bornfleth, Cutler Hammer Inc.; gray iron, Jack Genthe, Harnischfeger Corp.; steel, Edward Daehn, Pelton Steel Co.; and malleable, Joseph Gutenkunst, Milwaukee Malleable & Grey Iron Co.

The course for Racine and Kenosha will be conducted likewise

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on Wednesday evenings at the Racine Vocational school under the supervision of Raymond Flansburg, Belle City Malleable Iron Co. The South Milwaukee classes will be conducted by Emil Hansen, Wisconsin Appleton Co., at the South Milwaukee Vocational school on Monday and Friday evenings. Albert L. Pfeiffer, Allis Chalmers Mfg. Co., will have supervision of the course at the West Allis Vocational school on Tuesday evenings, and Ben D. Claffey will supervise the same course at the Waukesha Vocational school. A. C. Ziebel, Universal Foundry Co., will conduct the course of the Oshkosh Vocational school on Wednesday evenings.

Foundrymen Attend State Conference

Fourteenth annual Iron, Steel, and Allied Industries conference of the California State chamber of commerce was held at the Del Monte hotel, Del Monte, Calif., on Feb. 10 and 11. Group meetings of various industrial interests were held at which problems peculiar to each industry were discussed.

Approximately 30 foundrymen, from all parts of the state, heard C. B. Tibbetts, president, Los Angeles Steel Casting Co., discuss "Foundry Cost Estimating." Mr. Tibbetts speech was followed by a round table discussion in which many of the men took part. F. O. Edwards, personnel manager, Fisher Body Corp., Oakland, Calif., talked on "Industrial Relations." M. G. Wilson, Wilson & Nutwell, Fresno, Calif., was not able to attend the conference, but his paper on "Co-operation of California Foundrymen" was read.

E. L. Shaner, president, Penton Publishing Co., Cleveland, publisher of THE FOUNDRY, addressed the conference on "Industrial Statesmanship—Yesterday, Today and Tomorrow."

Officers Nominated By A.F.A. Committee

Nominating committee of the American Foundrymen's association met in Chicago, Feb. 10, to designate officers of the association for the coming year. Marshall Post, vice president, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., was nominated for president; and H. S. Washburn, president, Plainville Casting Co., Plainville, Conn., for vice president. For directors, to serve three years each, the committee named: Hyman Bornstein, director of research, Deere & Co., Moline, Ill.; F. A. Lorenz, Jr., vice president, American Steel Foundries, Chicago; D. O. Thomas, general manager, Saginaw Malleable Iron Division, General Motors Corp., Saginaw Mich.; G. A. Seyler, works manager, Lunkenheimer Co., Cincinnati; and H. S. Hersey, vice president, C. O. Bartlett & Snow Co., Cleveland.

In accordance with the provisions of the association by-laws, after the report of the nominating committee is published and at any time within 60 days prior to the date of the annual business meeting which is held during the annual convention, additional nominations for any or all vacancies may be submitted through a petition filed with the association secretary and signed by 25 members in good standing. Should no other candidates be so nominated, the nominations are closed.

Reader's Comment

EDITOR'S NOTE—*Material Appearing Under this Head Does Not Necessarily Reflect the Opinion of The Foundry or of Its Editors.*

Research

TO THE EDITORS:

Your editorial in the February issue of THE FOUNDRY entitled "Gray Iron Industry Needs Research Program" interested me deeply. The division of the business into the distinct branches of manufacture and sales goes far toward clarifying two fields of research so necessary to successful operation. Manufacture is one thing. The disposal of its products is quite separate.

The manufacturer is to some extent confined to what can successfully be applied to commercial use but knowledge that the manufacturer can uniformly produce material of definite characteristics unties the hands of the merchandising side of the operation in that the salesman can then offer to fill the needs of his customer with assurance that he will not let the latter down. He also can confidently seek new fields for the product.

Foundry research, as stated in your editorial, has made tremendous progress. The *Transactions* of the American Foundrymen's association, the *Cast Metals Handbook*, the publications of the Engineering foundation and the marvelous progress made in foundry equipment and supplies have brought gray iron far along the path of progress. But, as you so aptly state, there is much future study to be done to correlate foundry performance with market.

The necessary uniformity of products which can only be brought about by exhaustive joint research of metallurgist, superintendent, equipment manufacturer and supplier challenges the American Foundrymen's association's utmost effort for years to come. It must be done under the aegis of such an institution whose membership includes the most progressive of the classes mentioned and whose scientific research effort cannot be challenged by the manufacturer of other competitive materials, also members of the A. F. A., with which the resultant product must inevitably struggle for business.

Once uniformity of product is assured it enters into the field of sales and competition. It is here that such an institution as the Gray Iron Founders' society, composed exclusively of gray iron foundry executives, would seem to commence functioning. The establishing of standards of measured performance, certification and unceasing quality vigilance, are the sales weapons for developing increased use of the material.

It always has been more or less of a mystery to the undersigned, whose knowledge of actual foundry operations is confined in great measure to that obtained in a general engineering education, why the only definite specifications in general use should refer to a quality rarely invoked in recommending gray iron, i.e., tensile strength. While great development has been made in this regard it is not one of gray iron's outstanding qualities nor is the standard test bar necessarily a criterion of the pounds per square inch of the castings from the same heat.

What should be developed are systems of measurement and standards of such attributes of gray iron as damping effect, machinability, resistance to certain types of corrosion, etc. in which the designer is interested in the selection of his material. These corollaries are at present dealt with in such general terms as to be unsatisfactory to the precise thinking of the engineering mind and deserve profound consideration and development.

The foregoing only represents the opinion of the undersigned and has not received the official sanction of the society employing him.

W. W. ROSE
Executive Vice President
Gray Iron Founders' Society
Cleveland

Melting of Aluminum

(*Continued from page 27*)

moved from furnace to furnace, or stationary equipment with several thermocouples and a selector switch, are available for foundry temperature control.

Necessity for proper care of melting pots, and in fact, pouring ladles or other equipment which may come in contact with molten metal, cannot be stressed too greatly. Effect of contamination of metal from dirty equipment is often serious. Pots themselves should be cleaned thoroughly by scraping the walls to remove any loosely adhering scale which ultimately might work off into the metal. Iron pots, as well as other iron equipment, should be kept thoroughly coated at all times as a protection against iron pick-up. A coating of whiting is used with good results in many foundries. This should be applied after each cleaning and after the pot has been heated to just above the boiling point of water. Before charging metal in a newly coated pot, it should be thoroughly preheated to be sure that all the moisture is driven off.

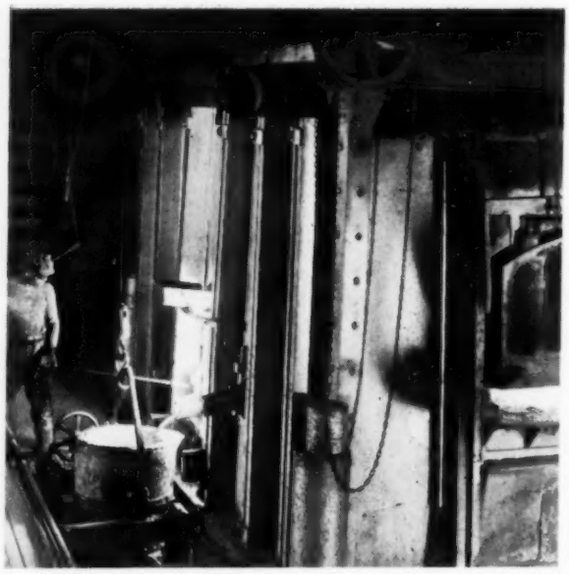

Fig. 6—Tapping a ladle of aluminum alloy from an open-hearth furnace

Chemical composition limits of aluminum alloys are maintained to provide certain characteristics, among which are the physical and casting properties. Altering the composition by the addition of foreign metallic elements picked up during melting and pouring adversely affects these characteristics and subsequent foundry difficulties may result. It is a comparatively easy matter, especially in foundries using a variety of metals, to contaminate the aluminum alloys, either through a mixing of the foundry scrap or by melting or pouring in equipment used previously for other materials and not thoroughly cleaned. It is also comparatively easy to establish a system to segregate the various metals and to insure a thorough cleaning of equipment between heats of different alloys. Such a system will aid materially in establishing a foundry metal supply with uniform characteristics.

Agitation of the metal when molten, either in the melting furnace or while transporting to the mold, increases oxide formation. Continual skimming of the metal increases the total oxide loss, since each time the protective oxide coating is removed a new one forms. If the metal must be agitated such as by stirring, this should be done from

(*Concluded on page 74*)

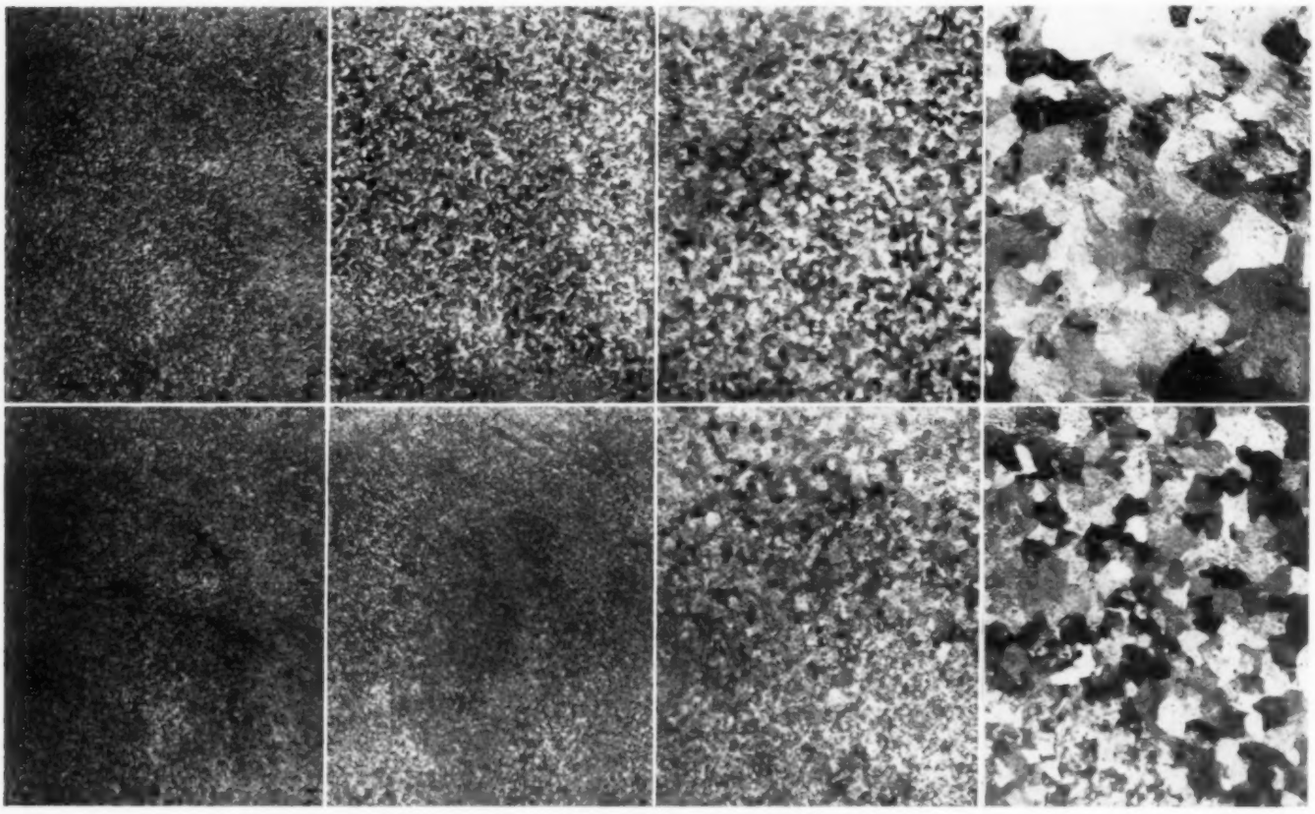

Fig. 7—Effect of melting and pouring temperature on grain structure of an 8 per cent copper-aluminum alloy. Upper row, left to right, heated to and poured at 1320 degrees, 1400 degrees, 1500 degrees, and 1700 degrees Fahr. Lower row, left to right, heated to 1320 degrees, 1400 degrees, 1500 degrees, and 1700 degrees Fahr., and all poured at 1320 degrees Fahr.

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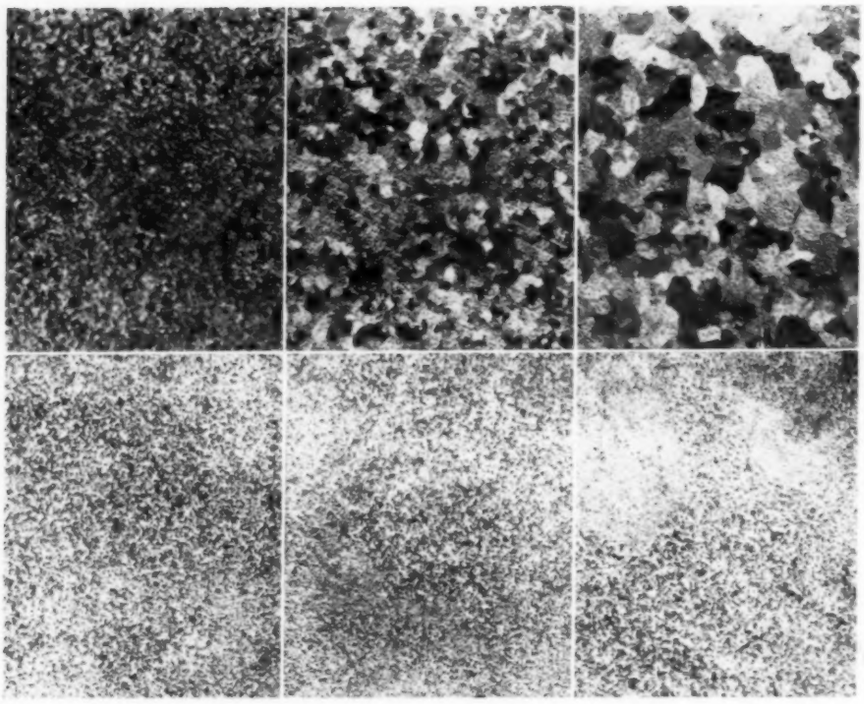

Fig. 8—Effect of soaking on grain structure of an 8 per cent copper-aluminum alloy. Upper row, left to right, soaked 0 hours, 4 hours and 24 hours at 1450 degrees Fahr., and poured at that temperature. Lower row, left to right, soaked 0 hours, 4 hours and 24 hours at 1320 degrees Fahr., and poured at the same temperature

(*Continued from page* 72)

the bottom upward, taking care to disturb the surface as little as possible. When transferring from furnace to ladle, or from ladle to ladle, the metal stream should be kept as short and with as few breaks as possible. It is preferable to skim only when ready to take the metal from the furnace and prior to pouring. By observing these simple practices, much difficulty attributable to oxides and dross can be eliminated.

The same practices that are beneficial in reducing oxidation are also desirable for reducing gas absorption. In addition, careful temperature control is necessary to maintain conditions which will prevent gas pick-up. Selection of metal also is a factor not to be overlooked, since condition of metal composing a furnace charge may influence the final quality. Sawings, borings, sheet scraps, and scrap castings often are coated with oil, grease or moisture. While all of these materials can be used satisfactorily in making castings, it may not always be possible to employ them directly in a furnace charge without some preliminary preparation, as the oxide coating or film of oil may produce sufficient gasing to cause unsoundness in the final castings. In some cases, preheating such material at a sufficiently high temperature to drive off the volatile matter will eliminate any trouble. In other cases it is preferable to melt the questionable material alone, pour it into ingot molds, and remelt the ingot for pouring into castings.

Although there are several metal treatments designed to help rid aluminum of excessive oxide and gas formed or absorbed during melting, it is an advantage to minimize these as much as possible. Use of a satisfactory melting and handling practice, and careful selection of materials should accomplish that purpose. However, there are cases where fluxing is found beneficial; such as when melting aluminum-magnesium alloys, metal to which a considerable amount of foundry scrap has been added, or when reclaiming skimmings, turnings, or other small scrap. These treatments will not correct the effect of a poor melting practice or improper handling of the metal after fluxing has been accomplished.

There are a number of materials commonly used, either by themselves or in combination, as fluxes for aluminum alloys. These might be properly divided into two general classes: Solid fluxes and the gaseous fluxes. Solid fluxes, such as some of the alkali chlorides and fluorides, which are liquid at the normal melting temperatures of aluminum alloys, provide a protective cover for the metal and have the property of dissolving or absorbing aluminum oxide to various degrees. Sodium chloride and cryolite are examples of such materials. Other metallic chlorides which are volatile at these metal temperatures act as mechanical fluxes; the resulting gas bubbling through the metal aids the escape of occluded oxides and gases. Such materials as aluminum chloride and zinc chloride act in this way.

Operation of fluxing must be carried out carefully if benefits are to be realized. In fact, unless proper control is exercised, more harm than good can be done the metal. When solid fluxes are used, they must be absolutely day and introduced into the metal in a way that will avoid excessive agitation. Gas fluxes likewise must be free of water

(*Concluded on page* 77)

Fig. 9—Metal for large castings requires as careful melting practice, temperature control and handling as that for small castings

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(*Concluded from page* 74)

vapor and hydrogen. These generally are piped to the bottom of the melting pot and allowed to diffuse through the metal. Amount of flux required for maximum benefit is a matter of trial, depending considerably on the type of metal entering into a charge.

The requirements for melting aluminum for foundry use, which will insure metal of maximum quality at the mold, may be summarized as follows:

(a) Selection of proper melting equipment and temperature equipment.

(b) Establishment of a handling practice which will minimize agitation of the metal while molten and permit low melting temperatures and short holding periods.

(c) Careful remelting and casting into ingot material which contains oily or oxidized scrap, unless the amount of contamination is so small that it can be removed by careful preheating before remelting.

(d) Flux the metal only to further improve its quality over that possible by careful melting, and not as a means of correcting the effects of poor melting room practices.

Meeting Your Responsibility

(*Continued from page* 32)

way of wages and salaries?

It has been estimated that the industry as a whole employs almost 300,000 men. Among these three hundred thousand, using an estimating weekly average of $28 for a forty hour week for all employes, the weekly foundry payroll is in excess of eighty four million dollars. Of course, this takes no account of salaries for management, office or selling organization. For this reason a weekly payroll of $100,000,000 is not beyond reason.

To arrive at an annual expenditure for foundry payroll even on the basis of intermittent operation, consider 20 weeks as constituting an average year's employment over good times and bad. We have eminent precedent for this inasmuch as social security bases its assessments upon the twenty week average. With this we can see that 20 weeks employment throughout the foundry industry means a sum of two billion dollars annual payroll—larger than the annual Federal relief expenditure said to be one and one half billion dollars.

Does this not instill a greater respect for the industry which we serve?

Manpower is vitally needed in the foundry industry. Attrition of age and disability has taken toll. Depression discouragement has caused many to seek more sheltered lines. We have not trained a new supply of men. It is estimated that the loss in skilled men in the foundry industry has been at the rate of more than 5 per cent per year for the past 6 years. Not enough trained men could be found to bring foundry operations back to 80 per cent of normal. Skilled jobs are begging for men and unskilled men seek jobs. And this lack of skilled men prevents employing larger numbers of unskilled. In the foundry industry it is fair to assume that the employment of one skilled man will permit the employment of from two to five unskilled men.

We have been lax in organizing training through the grades of apprenticeship, operative, foreman and superintendent. Such programs as are underway cannot begin to supply the demand with any marked improvement in business. More must be done—and quickly.

Foundries Should Train Boys

Every foundry should be making manpower through some form of apprentice training. Public interest demands it. With hundreds of thousands of boys in CCC camps, meritorious though they may be, why should not every foundryman have several boys and work with his fellow foundrymen—perhaps through his A. F. A. chapter to provide for organized instruction, interchange for the benefit of the learners and tie their effort together? Of course, it would cost. But better pay it direct than have it taxed away from you to give these youngsters something else.

It has been said that there are more than five million young men ranging from 16 to 23 anxious to work but unable to find jobs. Why can't the foundry industry use it's share? Naturally, some of these boys have finished school. Many have stepped out of our colleges half trained and find all doors closed to them. That raises the question of whether the foundries need any of the men graduating from engineering colleges this year and next. Last year practically all engineering graduates secured jobs at once. The same will be true in 1938.

It is disheartening to talk with students and find how few even know about the foundry industry and practically none, unless their Dads are foundrymen, have any inherent urge to seek employment in foundries after graduation. The steel mills, large electrical firms, machine tool, automotive and mining industries are bidding for these men. These are the big shows to the young engineers. And the side show attractions of welding, heat treating and forging make a strong ballyhoo to attract them.

What about foreman training?

The work of the American Foundrymen's association when it has been properly presented by far sighted managers has done much to raise the standard of foundry foremen—and superintendents, metallurgists and managers as well. The lecture course idea followed by the Chicago chapter, will be of inestimable value. The new program of Milwaukee chapter is splendid. The same is true of every chapter meeting, regional conference and the annual convention. And with the latter, do not forget the practical value of proper and thorough study of the exhibitions.

Some of the larger firms during the past few years have sent as many as 50 of their operating executives, foremen and key men to the annual conventions, each charged with some assigned study and many required to make detailed reports of what they learned.

That brings to mind this question of proper pay. To listen to some political yappers, we might assume that every employer of labor ground his payroll down and intentionally starved his men into taking a pittance. That is the lever by which the pressure is put on by government to impose minimum wage and hour laws. The reputable manufacturer, and he is in the large majority, is assailed for the greed of a few.

Decrease in Effectiveness

Some employers complain about the decrease in effectiveness of labor today. And labor costs have advanced. According to the National Industrial Conference Board, the cost per man hour in manufacturing increased 14.9 per cent between July 1936 and 1937. This increase in man hour cost has not been offset by increased productivity either in hand or mechanized labor. In fact, the number of man hours per unit of output increased 3.8 per cent while the output per man hour decreased 3.7 per cent in the period mentioned.

This is a problem of proper supervision and incentive pay. Inherently, if a man is interested in his work, sees opportunity and continuity of employment ahead and is paid in measure with others, his production will increase. Every man is interested in increasing his earning power—of course in the easiest way—but fundamentally his ambition for improvement in his own effectiveness ranks with his earnest desire for good continuous employment. It is the foundry manager's job to recognize this fact.

No single factor is more illustrative of this principle than in studying and measuring the successful business firms. Those who have compiled statistics on foundry earnings, and foundry wages and sal-

aries find that good pay invariably is encountered among the more successful establishments. Some might say that it was the case of the chicken and the egg as to which prece les.

After all, the most important element in any business is good will. And any well informed student of public relations can affirm that the first step lies in securing the enthusiastic good will of employes.

We have considered many things in a loose and hasty manner. One more remains. What about the silly age barriers which American business has set up? Uplifters have set the lower age limit at 16 and undoubtedly will revise this figure upward within our generation. NRA started to group as forbidden a large number of activities in which boys under 18 could not engage and the foundry operations would undoubtedly have come under that ban. Were this effective, a boy must engage only in sports and recreation aside from the few hours he spends in school, up to that minimum age barrier, if these people have their ultimate wish. Of course, he can drive a car, play football, get drunk, rob a bank or get married, but he must not work, before 16.

Employers themselves have set up the upper barrier—particularly where new employes are concerned. Many manfully stick to 45 as the dead line. Recently an employment agency in the Chicago district sought a man to take charge of a combined foundry and machine shop, capable of directing some 80 employes, acquainted with all phases of manufacture, capable of doing a bit of designing, able to get out and sell enough castings to provide a cushion against high overhead on the company's product. For this all around genius they declined to consider anyone over 35.

Perhaps this is an exception. But given good health, why is not a foundry superintendent or foreman of 50 equally likely to have the necessary qualifications as a man of 45, or 35? He will have at least 15 good years to pass along what he knows to the benefit of his employer and the junior executives before old man social security gets him. Isn't the manufacturing industry missing a bet? Common sense would teach that the valuable experience of many of these men, who are turned away because of their ripe old age and trembling senility at 45, is being lost forever. With a dearth of skilled men where will the teaching talent be found?

In all of this management question, one might inquire where the American Foundrymen's association qualifies to criticize and suggest.

In more than 40 years there has been no more active and efficient medium for training men in the foundry industry than the American Foundrymen's association. Papers, discussions, committee work and the exhibitions of the American Foundrymen's association have been a constant source of education to everyone engaged in the industry. Although handicapped by a small membership in comparison with the entire industry, the work which has been done is a tribute to the leaders of the industry who have been farsighted enough to support, by their participation, this stupendous training function.

The beneficiaries of this practical training program have been managers, and those who have made their jobs possible, namely, superintendents, foremen and a large group of ambitious workmen who through the years have advanced in each of the previous classifications of rank mentioned.

In more recent years the work of the association on apprentice training has been intensified. It has been immeasurably forwarded as has indeed all of the educational activities of the association by the formation of chapters now operating in twelve foundry centers. These chapters bring directly into every locality all of the mass of technical and practical information which is available. Furthermore, the association is working actively with engineering colleges where the knowledge of foundry practice serves to attract technical men to the foundry field and where accurate data on castings properties serves to advance the use of castings.

It is only within the past 10 or 15 years that engineers have had presented to them during their embryonic school days an accurate picture of the availability, usefulness and tremendous future possibility of castings application.

The association is meeting its responsibility in training men. Are you meeting yours as a manager in using this service?

Opens New Office

W. J. Bach, for many years sales representative in the Birmingham territory for the Werner G. Smith Co. division of Archer-Daniels-Midland Co., Cleveland, has opened a new office and warehouse at Twenty-fourth street and Twenty-ninth avenue, north, Birmingham. A stock of linoil and other core oils will be carried for service to foundries in the southwestern portion of the United States.

Hammond Machinery Builders Inc., Kalamazoo, Mich., has moved its eastern branch to 71 West Twenty-third street, New York. W. J. Holtmeier is eastern manager.

Malleable Founders To Push Research

Research and development committee of the Malleable Founders' society, at a recent meeting in Cleveland, set in motion a two-point research program for the current year. First phase of the program covers practical research, and includes the correlation of existing information on the processes and equipment employed by the 72 member plants in the manufacture of malleable iron. It may be regarded as an extension of the type of activity inherent in the shop practice councils which have helped the industry solve many problems.

Immediate objective of the practical survey will be the development of reliable standards for annealing. Particular attention will be devoted to the determination of proper cycles for different methods of annealing, covering different types of equipment; and to accommodate variations of specific analysis, casting design, section thickness, and requirements of use.

Second major activity of the committee will be pure research. Studies will be made of products other than normal malleable iron, sometimes referred to as pearlitic malleable. They will include investigations into the prevention of shrinks, dendritic structure, and graphitization of hard iron.

Acquires Firm

Morton L. Pereira & Associates, 100 West Monroe street, Chicago, have taken over the business of Frank D. Chase Inc., architects and engineers. Mr. Pereira was associated with the late Mr. Chase for 18 years and served as vice president for over 10 years.

Publishes Pamphlet

Machinery and Allied Products institute, 221 North La Salle street, Chicago, has published a pamphlet entitled "What Congress Can Do to Build Confidence, Increase Employment, and Restore Recovery." It advocates the repeal of the undistributed profit tax, amendment of the capital gains tax, and revision of the National labor relations act.

The following officers recently were elected by the board of directors of the Despatch Oven Co., Minneapolis: President, A. E. Grapp; vice president and general manager, H. L. Grapp; vice president and production manager, C. P. Doherty; vice president and chief engineer, G. C. Keyes; and secretary and sales manager, F. H. Faber.

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Use the right insulator for your job - - - green or dry sand - - - and get equally as good results.

We list below some of our insulators, if yours is not there we'll make it to order.

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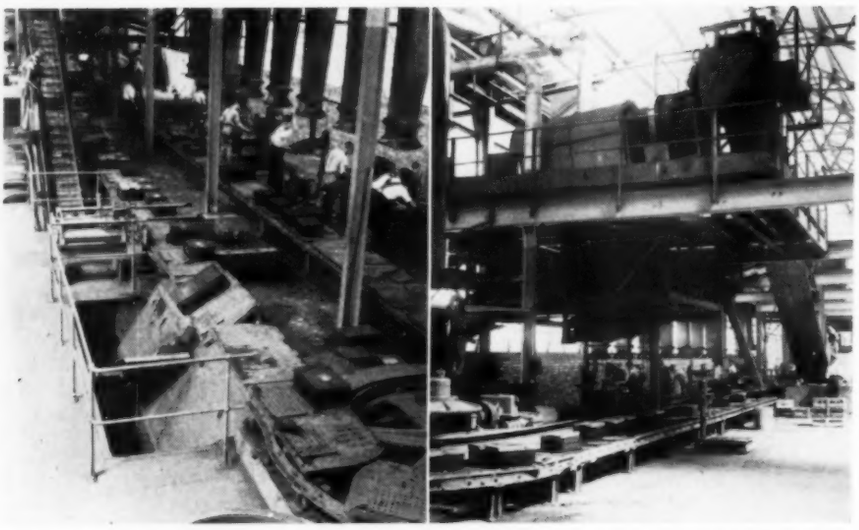

Fig. 6—Shakeout station is designed to handle molds made with and without flasks. Fig. 7—Sand reconditioning plant is located on a platform above the molding floor

Push Button Control

(*Continued from page* 30)

found their way through the screen.

The belt elevator, seen in Fig. 4, travels over practically the whole length of the unit, above the mold conveyor, and carries the sand mixture to a storage hopper of a capacity of about 17 tons. It is at this point that the final stages of the sand reconditioning take place. An end view of the plant is obtainable from Fig. 3. An adjustable distributing plate is at the bottom of the hopper. Before the sand drops from this plate it is humidified by adjustable jets placed above the plate and along a semicircle at the bottom part of the hopper.

From the distributor plate the sand mixture drops into a continuous muller. This operates at a slight angle, which can be modified. After having been mixed thoroughly, the sand comes out of the muller onto a small belt and is discharged into a vertical belt bucket elevator. At the top of the elevator the sand is discharged into a disintegrator of the revolving cage type, and from there it is dropped onto a push-plate conveyor, which delivers the sand at the various molding stations. That conveyor, shown in Fig. 4 is parallel to the other sand belt conveyor previously mentioned, and horizontal, being located just above the line of molding machines.

There are 12 points to be fed, and the sand simply drops through rectangular holes made in the fixed floor of the conveyor, which correspond to the hoppers placed above the molding machines as shown in Fig. 4. When a hopper is full, the sand is pushed over it by the push-plates and goes on to the next unfilled hopper. There usually is a small excess of sand at the end of the line, which, as previously explained, returns to the storage bin by the inclined conveyor belt. Thus the sand has made a complete circuit. Proportion of new sand used is about 1 per cent, and from 6000 to 7000 pounds of castings are made per ton of new sand. The quantity of sand required, leaving only a small surplus to be returned unused, depends upon the rate of operation of the molding machines, and is controlled by the controlled bottom ring underneath the 17-ton hopper, before the sand drops into the muller.

System Is Interlocked

Mention has already been made of the fact that the whole conveying system for sand and molds is interlocked. This is achieved through the control panel (Fig. 1). If a serious interruption occurs at one point of the conveying system, the whole system stops and can be restarted only by means of the control panel, which insures that the flow of movement will be restarted in the proper sequence and at the correct rate. In case of any mishap occurring in any of the conveying lines, a red light shows up at the control panel and indicates at which point of the equipment the mishap has occurred. The whole of the electrically-interlocked conveying system and sand-preparing plant absorbs from 50 to 60-horsepower. The sand-preparing plant and conveying system was supplied by Herbert Morris, Ltd., Loughborough, England.

On this mechanized unit, all the molds, whether boxless or in flasks,

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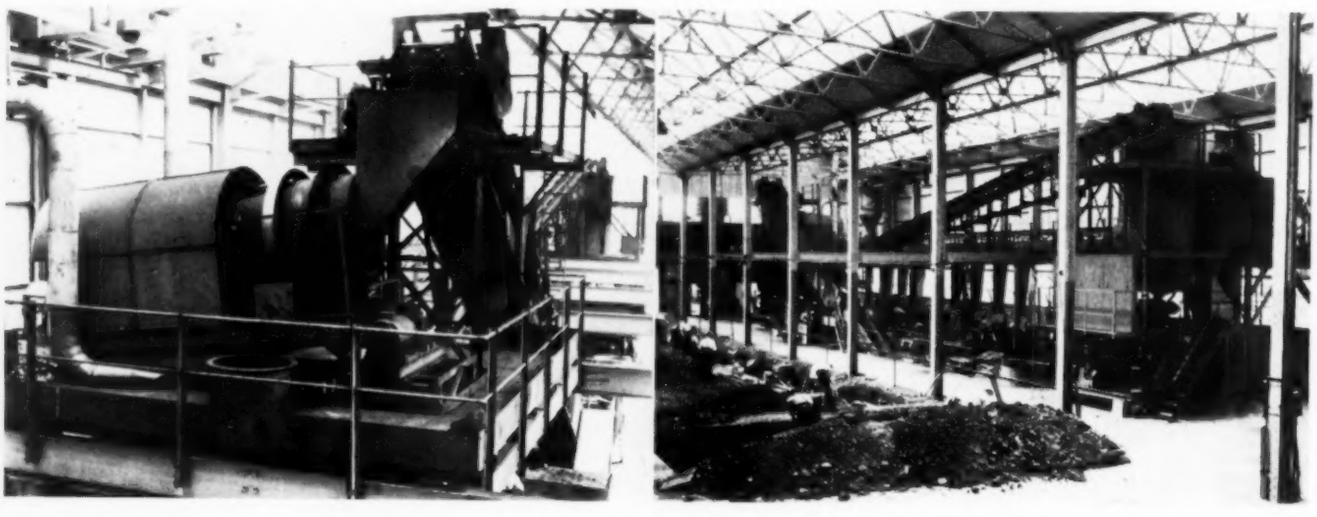

Fig. 8—Hot sand drops into a cooling drum and thence passes into a revolving, hooded screen. Fig. 9—General view of the present installation showing excavations for another unit in the foreground

ADVERTISING PAGES REMOVED

(*Concluded from page* 80)

are made on molding machines, each machine having its sand hopper immediately above it. There are 11 machines in operation. Some are hydraulic, some pneumatic, and some electrically operated. One set of molds, in flasks, 21 x 14 inches, is made on one pair of machines; one hydraulic and one electric. One machine produces the cope and the other produces the drag. The boxless molds are of standard size, 17 x 12 inches, employing standard bottom plates. The molds are made from metal pattern plates, and under normal conditions the rate of operation is about 60 molds an hour.

Pouring and weighing is effected at the end of the mold conveyor, opposite the cupola plant as in Fig. 2. One man pours for an output up to the rate of 300 to 350 molds an hour. After having been poured, the molds turn the corner and travel, on the line opposite to the molding machines, to the knock-out station, where the sequence of operations starts again.

The castings, after having been cleaned roughly, as shown in Fig. 6, are collected in trolley bins and taken to the cleaning and fettling department, indicated in Fig. 5. Fig. 9 gives a general idea of the whole mechanized unit, and shows the foundations being dug out for unit No. 2—practically identical to the one described.

Considerable care and forethought have been given to the conditions of working in this foundry. The 40-hour week is applied, and a pension scheme is available to all employes, who also enjoy 2 weeks' holiday per annum, with pay. The shower-bath and cloakroom accommodation is modern and complete.

Cost May Be Cut

(*Concluded from page* 37)

the material used for cementing the bricks together may be capable of such reaction, and thus the cement may be dissolved by chemical action and rapidly destroy the usefulness of the lining. Therefore, the cementing material should be similar to that from which the bricks themselves are made so that any chemical reaction cannot occur between the cement and the bricks, the cement and the metals, or the cement, bricks and metal combined.

A minimum of cement between bricks will be found most desirable, even though the cement is of the right character. This is due partly to the fact that when drying a lining after installation, the water in the cement must pass out and the passages through which it travels naturally provide openings through which the metal may pass into the lining. Therefore, a good brick to brick contact with a minimum amount of cement is the best practice in lining furnaces. Before deciding upon the lining to be used, the probable chemical reaction which will occur between lining and the materials in contact with it should be studied carefully from every possible angle. The time is not wasted since it may result in reduction in operating cost.

In the case of the crucible furnace the fuels will be in contact with the lining. The reaction between these fuels and the lining at elevated temperatures should be considered. If it is a hearth furnace on which the metal is to be melted, the reaction between the metals, the metal oxides, and the lining at elevated temperatures should be given due consideration.

Save in Maintenance Cost

Careful study of those points will result in a material saving in maintenance cost in the melting department, and frequently will reduce defective losses in the foundry itself, since a minimum opportunity for slag inclusions in the metal poured in the molds will result from improving refractory practice in the melting department.

Chemical reactions between the metal oxides and the refractory materials of course do not occur until an elevated temperature is provided and when the elevated temperature is sufficiently high, these actions do some surprising things. Thus it is desirable when considering the choice of a lining for a given type of service to remember that temperatures that now are available regularly a few years ago only occasionally were available. Consequently, modern conditions have resulted in demands for better lining materials which have been developed by the manufacturers of refractories. When given a chance to study the condition with the foundryman, refractory manufacturers may be able to improve the life and service of furnace linings.

Linings should be considered from the standpoint of number of pounds they produce rather than the months during which they have been in use, since operation is not continuous and, therefore, time is no measure as compared with pounds of metal per lining. The author believes that the foundryman will find that he can make his cost per pound of metal produced show a considerable saving by studying carefully the number of pounds of metal produced per lining, and then choosing the lining that gives him the maximum number of pounds per dollar of his investment.

Runner System Suits Casting

(*Continued from page* 36)

ings requiring little or no machining are poured at the second, or standard speed. With these castings, position of the gates is the most important feature. The gates or inlets should be placed to insure even distribution of the metal over the entire mold surface. Even temperature of the casting follows even distribution of the metal. This condition prevents hot spots and shrinkage. On this principle two runners are beter than one, three better than two and so on, with of course a reasonable limit.

Placing a gate as at *A*, Fig. 3 is a common cause of misrun castings. The metal impinges on the mold face, rebounds and chokes the gate. Correct position is shown at the opposite side *B* where the unrestricted metal may flow into the mold. Another example of a right and wrong gating system is shown on the flanged pipe, Fig. 4. Gated along one side the metal impinges on the core with the resulting formation of a scab or washed area and with the further probability of the slush remaining in the vicinity to cause a leak in the casting. Obviously the better method is to gate the casting at the end on both sides of the core so that the metal can enter the mold and flow freely.

Place Sprue at End

Careful attention must be given to runners and gates on small repetition castings before they are put into production. Having decided on the particular type of gate and runner, consideration should be given to the position of the sprue. Usually a sprue at the end or side of a mold is preferable to one in the center. This is illustrated in Fig. 5.

Fast running is applied through three different types of gates and runners to different classes of castings. Highly machined castings, liners, etc., must be poured rapidly. The best method is through a ring of small gates around the center core as shown in Fig. 6. The dropping metal breaks up any dross and prevents it from adhering to the wall of the mold or core. The dross finally rises into the sullage head. The principle is illustrated in Fig. 7 showing water from a tap falling into a glass vessel. Weight of the stream creates a space into which any floating foreign material is drawn. On large liners with ports, a bottom gate as shown at *G* is employed in addition to the top gates. The sprue leading to the bottom gate is opened first and metal is allowed to flow into the mold up to

any desired point, in this instance the lower ports. The gates on top then are opened. The same principle is applied to large fly wheels. A vertical sprue on each side of the hub core has the same effect of holding any dross in the vicinity. Eventually this dross will rise to the top where allowance on the pattern can be made for extra machining.

The second class of castings into which metal must be poured quickly are of the heavy type, for example the disk fly wheel shown in Fig. 8, where a large expanse of mold face is exposed to the heat of the rising metal. If the casting speed is too low, the heat of the metal will destroy the bond in the sand with the result that the face will crack, contract and finally peel off. Another reason for speedy pouring of this type of casting is that while metal is filling the plate, the actual rise of metal in the mold is retarded and therefore any dross present will have a chance to adhere to the side walls *A* and *B*. Recommended method of pouring this casting is through five or six gates on the top rim as shown in the illustration Fig. 9.

Rapid Pouring Necessary

The third type of casting which must be poured quickly is one with thin or intricate sections, for example radiators, stove grates, lawn mower castings, etc. Speed of pouring is necessary to prevent cold shuts and to secure a complete impression of the mold.

Use of risers should be curtailed as much as possible. Time in making, return scrap, etc., add to the cost of producing the castings.

Dross entering the mold through the runner and gates will not come up through the risers. In nearly all cases the dross will be found near the point where the metal enters the mold. This statement readily may be verified by watching an open sand mold, or by looking down through a large riser. Metal rising in the risers usually is quite clean. This would seem to indicate that metal is cleansed by traveling through a mold. For this reason, gates on important castings should not be located near areas that are to be machined.

Necessary risers should be placed on the highest points of the casting, or on any point where gas bubbles might appear. Where rod feeding is necessary the riser should be of sufficient size to make the feeding effective. The rod should be worked around the sides of the riser to keep all the metal in a liquid state as long as possible, or until the metal in the casting has solidified. In some instances whistlers and blind risers are not effective. Blowholes are found at the point where they join or are attached to the casting.

On cover castings, plates, mixer pans and others of a similar character where a large area of metal rises toward the top of the mold, a flowoff riser is useful in relieving the strain at the moment the mold is filled and the greatest pressure is exerted against the face of the cope.

The runner bush should be constructed with care and in a manner to prevent any dross from entering the sprues. If the sprue is in the center, a whirling action is created. Dross is drawn into the whirlpool, down through the sprue, into the gates and eventually into the mold. This point is illustrated in the small tun dish type usually employed on small molds and shown in Fig. 10.

To be effective, the runner basin must be wider and deeper at the point where metal is poured from the ladle than at the opposite end where the metal enters the sprue as shown in Fig. 11. While pouring is in progress it will be noted that the principle of the metal drop hown in Fig. 7 again is in evidence. Any floating dross will appear near the center and not immediately above the entrance to the sprue.

The runner bush from the fly wheel shown in Figs. 8 and 9 should be made up as shown in Fig. 12. Cake cores should form the tops of the sprues and a cake core also should be bedded in the bottom of the pouring basin at the point where the metal falls from the ladle lip. The sprues should be plugged until the basin is filled with metal.

Another type of runner basin is shown in Fig. 13 where two down gates are located some distance apart. A small circular pouring basin with the sprue opening located close to one side is shown in Fig. 14. A proper runner basin will insure a calm top to the metal during the pouring period and any dross will be kept away from the sprue opening. Every foundryman knows from experience that a large number of scrap castings are due to incorrect gating methods. Too much stress therefore cannot be laid on the fact that the gating system of any casting requires careful consideration.

Report on Savings

The Machinery & Allied Products institute, Chicago, has published a report of a study on "Savings and American Progress." Legislation, such as the undistributed profits tax of 1936, says the institute, has discouraged business and industrial savings and investment in capital equipment. Upon the use of these savings, it believes, depends the recovery and progress of the durable goods industries. Copies of the report may be secured from the offices of the institute, 221 North La Salle street, Chicago.

Offices of the National Farm Chemurgic council have been moved from Dearborn, Mich., to 654 Madison avenue, New York.

Conveyors Are Mounted on Springs

INTERESTING illustration of spring-mounted conveyors used to carry empty molds from the shakeout to the molding department. The empty molds are placed on the conveyor at the shakeout by an overhead crane. Bearings are subjected to direct impact of loading and handling these molds, which weigh as much as 10 ton. Illustration Courtesy Mathews Conveyer Co.

FOUNDRIES *are Reducing Costs with* MELTRITE

PIG IRON

PM

No one has been quicker to appreciate the advantages of Meltrite than the skilled foundryman seeking quality at a saving.

To this man in hundreds of foundries Meltrite pigs offer advantages:

- Easier to handle because of light, uniform weight, and rounded edges.
- Faster melting. Smaller and better proportioned, they allow heat to reach the center from all sides more quickly.
- More uniform melting because of uniform size and being nearer the weight average of the rest of the charge.
- Greater economy—requiring less fuel because of reduction in melting time.
- Reduction of oxidation losses. Meltrite is quick melting, passes rapidly through free oxygen zone.

Our foundry service department is available without obligation to pig iron and foundry coke users.

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Standardize Cupola Practice

(*Continued from page* 35)

brick and block, silica sand, ganister, fireclay, and in some cases *firestone* blocks that are impure silica. The blocks used in cupola linings must withstand high temperature and corroding influence of slag, particularly in the melting zone, and the abrasive action of the descending charges. A theoretically pure fireclay, from which the firebrick and blocks are made, would contain about 46 per cent alumina and 54 per cent silica as the material is a silicate of alumina.

Actually there always are some impurities such as lime, magnesia, iron oxide, potassium and sodium oxides, etc. present which lower the refractoriness of the fireclay. The alkalies and iron oxide particularly tend to act as fluxes so that the minimum amounts of these should be present. Various fireclays have silica and alumina contents both higher and lower than the values given previously, so that a mixture of clays usually is employed in producing firebrick and block to meet various requirements.

Physical Structure Important

Physical structure of firebrick is of great importance. Brick may vary from an open, porous structure to a dense structure and may be coarsely granular or very fine grained. In addition, in firing the brick, they may be light, medium or hard burned. The cupola requires a dense, hard burned brick as lining material for best results.

It is necessary to have a fairly thick lining in the melting zone as a considerable portion will be cut and corroded away. When it is recalled that temperatures in excess of 3100 degrees Fahr. are obtained in this zone the severity of the service will be realized particularly as that temperature is well above the softening point of most fireclays.

In operation burning out of the cupola lining at the melting zone increases as the length of the heat is increased up to a certain point. After the oval shaped contour is formed at a maximum, the burning away does not progress nearly as rapidly as the length of heat increases. One large automobile producer lines the cupola melting zones to the shape to which it normally burns out and claims a decided saving in refractory costs. Clays used with the firebrick should be equally as refractory as the brick and a minium amount used when lining the cupola as the joints of the block or brick should be as tight as possible.

Firestone containing over 90 per cent silica is used in the melting zone by some operators. When a melting zone is lined the firestone should be dry or the new lining should be slowly and thoroughly dried out so that the sudden formation of steam in it will not cause deterioration. Rammed ganister linings are used to a limited extent by some operators.

Daubing material used in cupola repairing is made with silica sand or ground reclaimed firebrick called grog, and fireclay. The maximum amount of silica or grog is used with the particular clay employed to get the proper consistency. As clays tend to shrink when highly heated, due to loss of combined water, and this shrinkage results in cracking, it is desirable to keep clay content at a minimum. Lining materials used in ladles are of the same type as those used in the cupola. In addition, a layer of insulating material in rammed or brick form is being used increasingly between the refractory lining and the ladle shell to preserve the heat in the molten metal.

During melting in the cupola certain gains and losses occur in the elements present in the metal and a loss of some iron also occurs. There is always a small loss by oxidation of silicon and manganese. In a properly operated cupola the silicon loss should be about 5 per cent and not over 10 per cent. In a 2.20 per cent silicon iron charge the actual silicon loss should be about 0.10 per cent and not over 0.22 per cent as a maximum value.

Similarly the manganese loss usually will run about 10 per cent of the amount charged. The same comments hold true for oxidizable alloying elements such as chromium. If losses are greater than these amounts an unduly oxidizing atmosphere is being obtained due to excess blast or low fuel bed and low coke charges for the blast being used. Silicon and manganese so oxidized combine with the lime to form the slag. The slag also takes up iron oxide (rust) from the metal charge as well as the iron oxide formed to a limited extent during melting.

Sand adhering to the metal charge as well as the coke ash and silica content of the limestone itself all pass into the slag which is largely complex calcium silicates. Excessive oxidation is to be avoided strictly as the practical result is low carbon pickup with hard spots and difficult machining and also increased shrinkage and decreased fluidity of metal which mean increased scrap and costs.

Sulphur Content Increased

Sulphur content of the metal charge is increased during melting by a portion of the sulphur content of the coke. The increase, depending on type of metals charged, sulphur content of the charge and of the coke used, may range from about 0.03 up to 0.10 per cent normally. In a so-called normal charge used for automotive castings the increase will run about 0.04 to 0.06 per cent.

Carbon content of the metal is increased usually during melting by carburization through carbon

(*Concluded on page* 89)

INTERNATIONAL HARVESTER COMPANY

Date 1-27-37

Tractor Works

GREY IRON FOUNDRY CUPOLA MIXTURE

Bin No.	Per Cent	Lbs. per Charge	% Silicon In		% Carbon In		% Sulphur In		% Phosphorus In		% Manganese In		% Nickel In		% Chrome In	
			Metal	Charge	Metal	Charge	Metal	Charge	Metal	Charge	Metal	Charge	Metal	Charge	Metal	Charge
9	11	330	3.14	0.35	3.57	0.39	.025	.003	.630	.069	0.69	0.08	—	—	—	—
4	28	840	2.27	0.63	3.85	1.11	.022	.006	.131	.037	0.83	0.23	—	—	—	—
1	3	90	10.15	0.30	2.00	0.06	.031	.001	.075	.002	3.09	0.09	1.06	0.03	2.13	0.06
Steel	16	480	0.12	0.02	0.40	0.06	.025	.004	.130	.025	0.85	0.09	0.80	0.13	0.40	0.06
Pig Scrap	19	570	2.25	0.43	3.30	0.63	.100	.019	.200	.038	0.50	0.09	0.10	0.02	0.05	0.01
Remelt	23	690	2.25	0.52	3.45	0.79	.101	.023	.200	.046	0.65	0.15	0.22	0.05	0.17	0.04
% in Charge				2.25		3.04		.056		.197		0.73		0.23		0.17
% Change in Melting				−0.10		+0.40		+.045		+.003		−0.07		—		−0.01
% in Melted Metal				2.15		3.44		.101		.200		0.67		0.23		0.16

Weight of Charge 3000 Lbs.

Makeup of Charge		Pig Iron	
Type	Per Cent	Kind	Per Cent
Pig	42	Ky.	11
Steel	16	Hall.	28
Scrap	42	S.A.	3
	100		42

Fig. 8—Typical cupola metal mixture employed in an automotive foundry

(*Concluded from page 86*)

monoxide gas while descending toward the melting zone and probably during passage through the melting zone. Little if any carburizing occurs in the well or crucible. The amount of carbon pick-up varies with the type of charge and with cupola operation. In melting a pig iron-scrap iron charge, with a high carbon content, the carbon increase may be nil, while in melting an all steel charge the carbon increase may range from 2.20 up to 2.80 per cent or more.

Using a normal 15 to 20 per cent steel-mix charge for automotive castings having a carbon content of about 2.95 to 3.05 per cent we obtain a carbon increase of from 0.30 to 0.45 per cent. Melting at high temperatures seems to result in the higher range of carbon increase indicating increased absorption while passing through the melting zone. Use of excessive amounts of coke resulting in a high carbon monoxide gas production will cause high carbon increases during melting.

With proper cupola operation the carbon content of melted metal is controlled largely by use of low carbon metal in the charge. Steel is used for this purpose. With an all steel charge a final carbon content of from 2.75 to 3.00 per cent or over may be obtained while with no steel in the charge (pig iron and cast iron scrap only) a carbon content of from 3.50 to 3.75 per cent may be obtained. By varying the steel content of the charge used, variations in total carbon between these extremes may be had.

Mixture or mixtures used in the cupola should be calculated as completely as possible to be fully aware of all changes obtained during melting. A typical cupola metal mixture as used in our automotive foundries at the present time is given in Fig. 8.

On the questions of gray iron mixtures in general it is almost impossible to be specific unless one knows the type of casting or class of castings to be made and the properties desired in them. As extreme examples the author has employed charges of the cheapest burned scrap available to cast weights on which no machining was done and on which the only requirement was weight. He also has employed mixtures containing over 50 per cent pig iron for light thin-sectioned castings in which maximum machinability was desired.

It should be the aim of the metallurgist in charge of mixtures to use the most economical mixtures possible that will produce iron of the desired or necessary physical properties. This latter consideration may cause the use of initially higher cost metal charges which yield the particular results necessary for low foundry scrap losses and good machinability.

Calculations involved consist in determining the percentages of various materials to be used, setting down of percentages of various elements in each item, multiplication of the percentage of each element in each item by the percentage of the item being used, addition of products which gives the percentage of each element in the charge, addition or subtraction due to increase or loss during melting and the final results desired are obtained. It is desirable to determine the best proportions of each type or class of material for the class of work being produced and then to adhere to that basic mixture as consistently as possible.

Care always should be taken to weigh accurately all items used to make up charges. Weighing equipment used should be rugged, simple and preferably of the recording type. Items constituting a very small percentage of the charge should be weighed separately. The coke and metal preferably should be weighed separately.

In charging we prefer to place pig iron around the outside with steel, scrap and fuel toward the center. With mechanical charging equipment this distribution is often impractical and the use of large mixing ladles to mix and average three or more melted charges is of added value in the large tonnage mechanized foundries.

There are certain impurities in the metal charges used in the cupola that must be fluxed off and removed. Some rust, dirt, sand and clay-wash accompany the pig iron and scrap used and the ash of the coke, as well as some silica and alumina in the fluxing material itself, all have to be separated and removed from the iron during melting.

Limestone is found to be the most economical and efficient fluxing material to use. The calcium in it combines with the impurities mentioned forming a light weight slag which floats on the metal and is removed from it readily. Dolomite (magnesium bearing limestone) is frequently used. The calcium or combined calcium and magnesium carbonate contents should be over 95 per cent. There are abundant supplies of high grade limestone available at low cost.

Usually from about 2 to 5 per cent by weight of the metal charge is used. If it is desirable to thin out the slag or to help prevent bridging in small diameter cupolas fluorspar (calcium fluoride) may be used. economically. It is seldom used in excess of 10 per cent by weight of the weight of limestone being used in the normal cupola charge.

Develop Apprentice Training Program

Approximately 150 representatives of the steel foundry industry were present at the thirty-sixth annual meeting of the Steel Founder's Society of America which was held at Hotel Statler, Cleveland, on Feb. 9 and 10. Close attention was given to various committee reports which were constructive and well received. Much progress was reported by divisional chairmen heading various groups concerned with manufacturing phases to improve the quality of steel castings, and to advance foundry methods. It was said that about three-fourths of the industry now was organized to participate in those purposes.

F. A. Lorenz Jr., American Steel Foundries, Chicago, presented an interesting address on conditions within the industry, and on general economic conditions. Chauncey Belknap, counsel for the society, gave an account of recent legislation, and discussed its relation to business and industry. Other speakers were C. M. White; Republic Steel Corp., Cleveland; Whiting Williams, Cleveland, who discussed employer-employe relationships, and Prof. Russell Weisman, Western Reserve university, Cleveland, who spoke on the immediate economic outlook.

One of the most interesting reports presented at the meeting was that of the apprentice training committee which was read by Harold S. Falk, Falk Corp., Milwaukee. It points out that conservative estimates indicate that about 7 per cent of industry's skilled men are lost each year as the result of death, superannuation, transfer to other occupations and other causes, and that the best method of replacing those losses is through apprenticeship training.

The report then gives detailed information on how apprentices can be trained, selection of boys, number to be trained, contract forms, work and wage schedules, and related instruction. It points out that the 4-year schedule is advisable for the greenest material while shorter schedules can be offered to boys whose education and experience justify reductions in training time.

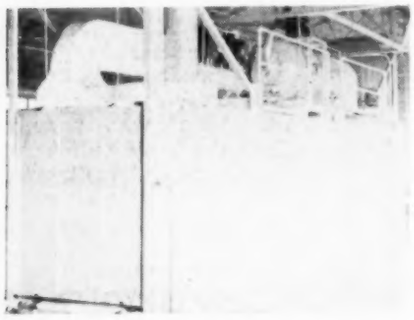
Opens Warehouse

Milwaukee Chaplet & Mfg. Co., 1023 South Fortieth street, Milwaukee, manufacturers of chaplets, partings and core paste, has established a Birmingham warehouse for the convenience of southern foundries. The new organization will be known as Foundry Service Co., and will be located at 2329 Twenty-ninth avenue, north, Birmingham, Ala. It will be supervised by W. J. Bach.

NEW EQUIPMENT and SUPPLIES

Oil Fired Oven

The accompanying illustration shows a new core oven heated by a direct fired, oil heater. Both units were manufactured by the Despatch



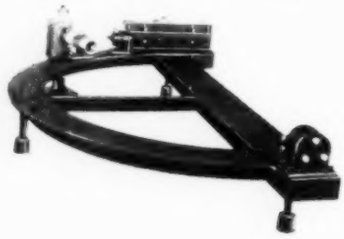
Core baking oven is heated with a direct fired, oil heater which is mounted on top

Oven Co., 622 Ninth street, Minneapolis, Minn. The oven is 6 feet wide, 31 feet 8 inches deep, and 7 feet high, inside dimensions. It is of metal panel construction with insulated sides and floor. The capacity of the oven is 8000 pounds of cores per charge with 3-hour preheat and 1-hour bake. The oven is equipped with an indicating controller operating in conjunction with a motor valve to control the temperature automatically within close limits.

Heating of the oven is accomplished with a direct fired unit which is mounted on top of the oven as shown in the accompanying illustration. The unit is the recirculation type, and air for oil combustion is supplied by a pressure blower. The burner flame is short and stubby to prevent damage to fan blades and to aid in obtaining maximum combustion efficiency. Grades of fuel oil from 1 to 5 or 6 can be burned efficiently in the heater. Oil and air are premixed in proper proportions before entering the combustion chamber. Heat from the burner is conducted into the oven through a system of distributing ducts.

Spectrograph

Harry W. Dietert Co., 9330 Roselawn avenue, Detroit, has acquired the sales agency in the East and Middle-West for the Applied Research Laboratory spectrograph and has established a spectrograph laboratory to determine to what use prospective customers can put spectrograph analysis and also to train



Above — Comparator projector with screen. Below—Spectrograph with arc house grating and camera

the customer's technicians in correct operation.

The spectrograph is applicable to industrial control and research problems involving qualitative and quantitative analysis of ferrous and nonferrous metals. The unit is of the grating type yielding the highest resolution and dispersion with high sensitivity and speed. An arc or a high voltage spark gap is obtainable to volatilize the specimen. The camera utilizes a standard 35-millimeter motion picture film in a 100-feet roll. Each exposure extending 12½ inches covers 2200 Angstrom units of spectrum.

A projection comparator enables the operator to project on a screen the spectra of a known sample for rapid identification of elements present in qualitative analysis. The photo-densitometer unit includes a battery, voltage compensating device and rugged microammeter to read spectra line intensity for quantitative analyses at the same time that qualitative analysis is made. It is claimed that a high degree of speed and accuracy are secured at low cost of equipment and operation. The device is suitable for quantitative and qualitative analysis of contamination or intended additions in metals and many other materials.

Window Switch

Cutler-Hammer, Inc., Milwaukee, Wis., has designed a mill duty safety switch with a window in the cover to make inspection of the blades possible from the outside. This window is three-sixteenth inch shatterproof glass held securely in place from the inside. A sponge rubber gasket is used to cushion the glass and seal the opening in the cover.

This window type line, which was developed to meet the demand for quick and safe inspection, is available in standard sizes from 30 to 1200 amperes up to 600 volts, fusible and nonfusible. Switches are characterized by quick make and quick break mechanisms, pressure-type fuse clamps, noncurrent carrying hinge posts, double break air-blanketed contacts, silver plated blades and jaws, and unit pole construction. The covers are interlocking, with key releases and provisions for padlocking.

For Every Kind of Casting . . .

For Every Type of Grinder . . .

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FOUNDRY WHEELS

THE Norton line of newly improved foundry wheels has the variety necessary to meet every requirement —Alundum, 15 Alundum and Crystolon abrasives; the new "B-E" vitrified, resinoid and rubber bonds, a wide variety of grain sizes, grades and structures in each abrasive and bond, special filler treatments for some metals to reduce loading and improve cutting action. It will pay you in dollars and cents to take advantage of these wheels—to let Norton engineers fit them expertly to your foundry grinding jobs.

. .

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NORTON ABRASIVES

W-635

Air Compressors

Schramm Inc., West Chester, Pa., has announced a new line of stationary air compressors for belt drive. A complete assembly, shown in the accompanying illustration, includes

Motor and compressor are mounted on a single frame base

a straightline compressor together with a short V-belt drive and vertical air receiver. These elements are mounted on a single frame base which eliminates the necessity of a special foundation. Compressors are driven by 1800-revolutions-per-minute motors; these can be built in for direct motor drive. The compressors themselves have forced-feed lubrication, mechanically operated intake valves, and water cooling.

Switcher Crane

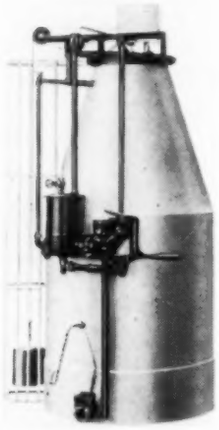
A switcher crane, manufactured by the Harnischfeger Corp., Milwaukee, and shown in the accompanying illustration is used for loading steel scrap turnings into a gondola car. In addition the crane also may be used to handle pig iron and scrap employing a 36-inch magnet

Switcher crane may be employed for handling materials with magnet or bucket, and for switching cars in the plant yard

energized from a direct connected generator in the crane cab. Freight and other cars in the plant yard also may be spotted and switched with the crane. The switcher crane is claimed to be quite stable on both magnet and clamshell jobs up to approximately a 20-foot radius from the center pin. The boom is 30 feet long.

Makes Acetylene

Air Reduction Sales Co., 60 East 42nd street, New York, has added two double-rated, stationary generators to its line of oxyacetylene equipment. The new generators, one of which is shown in the accompanying illustration, are available in 300 and 500-pound carbide



Acetylene generators are designed to supply large volumes of gas for production work

capacities, and have rated delivery capacities of 600 and 1000 cubic feet of acetylene per hour. The units are designed for plants requiring large amounts of gas for steady production. The 300-pound generator is 42¾ inches in diameter and 105 inches high. The 500-pound shell is 54¾ inches in diameter, and 115 inches high.

Pressure control of the units is said to be simple and effective, and located at the top of the generator away from the lime and water. Feeding of carbide is from a feeding disk driven by a gravity motor controlled by the pressure control. The pressure control is linked to the governor of the motor so that feeding would cease in event of failure of the former. Both generators are equipped with a hydraulic back pressure chamber and a mechanical double-action check valve. During recharging the sludge is forced out by existing pressure in the generator without opening it to the atmosphere.

Asbestos Glove

A reversible asbestos gauntlet glove, which fits either hand, recently has been placed on the market by the Industrial Gloves Co., 711 Garfield boulevard, Danville, Ill. The

Asbestos glove may be worn on either right or left hand

glove shown in the accompanying illustration, designed to afford protection in handling hot materials, is without seams back or front to eliminate ripping. All seams are in the fingers where no strain exists. On operations where gloves have to be removed frequently, no time is lost in selecting a right or left hand glove. Either glove fits either hand. Gloves may be had in any length, lined or unlined.

Electric Drill

Stanley Electric Tool division, the Stanley Works, New Britain, Conn., recently has placed on the market two new light weight, electric drills for production work. They are 2¾ inches in diameter, and are of compact design for use in close quarters. The drills are available in three different speeds for drilling in metal, wood or other materials. The gears are nickel steel, specially heat treated. Drills are full ball bearing, with a strong aluminum alloy housing. One type has the switch mounted on the rear end bell, while the other has an automatic pistol

(*Concluded on page* 95)

Electric drills are compact in design to permit application in close quarters

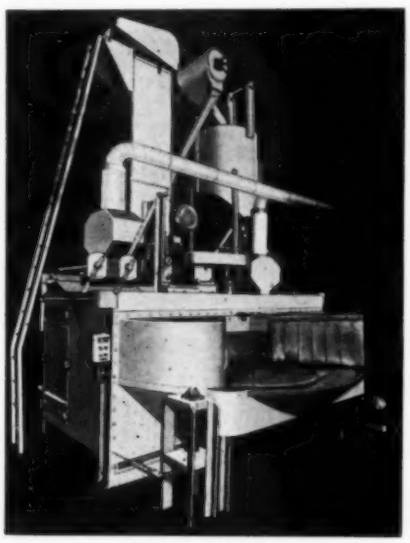
ADVERTISING PAGES REMOVED

(*Concluded from page 92*)
type handle in which the switch is mounted. Capacities of the drills are 3/16-inch and ¼-inch.

Cleaning Castings

American Foundry Equipment Co., Mishawaka, Ind., recently has placed on the market a table type abrasive blast unit designed especially for handling the rough and finish blasting of stoveplate prior to enameling, japanning, painting, etc. In the unit, shown in the accompanying illustration, two airless abrasive blasting units are mounted so that work passing through the blasting zone is showered by a continuous blast. After striking the work, the abrasive drops into a hopper, feeding a bucket elevator which raises the abrasive to a point above the machine where refuse, scrap metal and other foreign material are screened out. Following that the abrasive passes through a special separator which removes any sand present in the metallic abrasive.

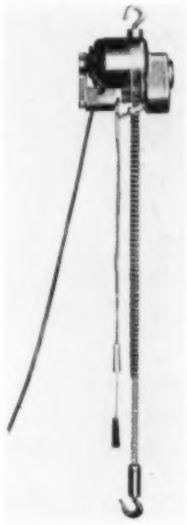
Work to be cleaned in the machine is carried through the cabinet on 4 tables each 48 inches in diameter. The tables are mounted on a main spider which carries them in and out of the cleaning cabinet. As the tables pass through the blasting zone, they are revolved, which is claimed to expose every surface of the work to the action of the abrasive. Rubber covering over the tables protects their surfaces from action of the abrasive. When work is being cleaned for finish enameling, an electrically timed indexing system controls the movement of the tables in and out of the blasting zone. Each table rotates a predetermined length of time under the blast.



Work to be cleaned is placed on tables which begin to revolve when they enter the blasting cabinet

Portable Hoist

Shaw-Box Crane & Hoist division, Manning, Maxwell & Moore, Inc., Muskegon, Mich., recently has placed on the market a light weight portable electric hoist of 500 pounds lifting capacity. The new hoist, shown in the accompanying illustration, weighs 58 pounds. The unit is operated from lighting sockets. The regular type is equipped with chain for a lift of 10 feet. Distance between upper hook and load hook at highest position is 16 inches. With maximum load of 500 pounds the lifting speed is 17 feet per minute.

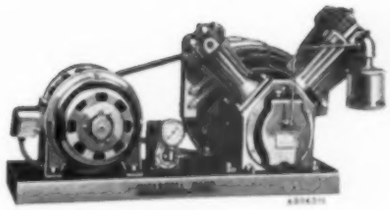


New type electric hoist may be operated from light socket

Features include one-hand control by which one hand of the operator always is free to guide the load; safety stops that prevent over travel of the hoist hook either up or down; spring cushioned load hook; device to prevent over loading the hoist by more than 10 per cent, and an arrangement by which the load may be lowered by power or gravity. The hoist is enclosed with the gearing operating in an oil bath. Roller chain is employed instead of the usual link chain. Gears and pinions are alloy steel, with machine cut teeth and heat treated. Load shaft is nickel steel. Needle type roller bearings are used at all bearing points.

Air Compressor

Ingersoll-Rand Co., Phillipsburg, N. J., has placed on the market a line of small industrial compressors and vacuum pumps which range in size from ¼ to 15 horsepower. One of the units is shown in the accompanying illustration. More than 50 models are in the classification which is known as type 30, and are available in single and multicylinder units. Cylinders are cast separately with radiating fins on cylinders and heads for air cooling. Cylinders are honed and lapped. Drive to the compressors and pumps is by V-belt.



Industrial compressors and vacuum pumps may be obtained in a variety of sizes to fit numerous needs

A pressure regulator controls the automatic start and stop, and the compressors will operate continuously at discharge pressures for which they are designed. Plate valves similar to those employed on the firm's large compressors are used on the small units. Improved air inlet strainer and muffler is said to eliminate intake noise and assure clean air to cylinders and valves. Cylinders are cooled with fan type flywheel, and a centrifugal governor unloads machine whenever it stops so that motor cannot burn out due to compressor being loaded.

Welding Rod

Suffolk Iron Foundry, Ltd., Stowmarket, England, recently has placed on the market a welding rod for low temperature cast iron welding in which the parent metal is not melted but brought to a bright red heat. The parts to be welded are veed out in the usual manner to an enclosed angle of approximately 80 degrees with the bottom of the *V* somewhat rounded. The *V* and adjacent surfaces are smeared with a special paste flux and the rod similarly is coated.

The casting is preheated to a black red temperature either with the blow pipe or by any other convenient method. When expansion trouble is not anticipated, local preheating only is necessary. The sides of the *V* are brought to a bright red with a neutral flame and a blow pipe tip one size smaller than that used for the ordinary method of welding material of similar section. The end of the fluxed rod is brought into the flame where a drop melts off and falls on to one side of the *V*. If the parent metal is at the correct temperature this drop spreads out over the surface, melts a thin film like water poured over ice and fuses.

Additional drops continue to fall as the welding proceeds. The same type rod can be used on malleable iron or steel.

OBITUARY

FRANK J. McGRAIL, 64, for the past several years foundry superintendent Struthers-Wells-Titusville Corp., Titusville, Pa., died in that city Feb. 9 after a month's illness. Mr. McGrail was born in Providence, R. I., Dec. 11, 1874, where he served a 7-year apprenticeship in the pattern shop, foundry and machine shop of the George E. Corliss Engine Co. Following his apprenticeship he spent several years at sea, first on the grand banks with the Gloucester fishing fleet and later as a deep water sailor in the old wind jammers he visited practically all the great ports of the world. Ashore again as journeyman molder he worked in many sections of the United States and in several foreign countries. As a foundry superintendent he has held positions with the Worthington Pump & Machinery Corp., Harrison, N. J.; Struthers-Wells Corp., Titusville, Pa., and Warren, O.; Erie Foundry Co., Erie, Pa.; Gleason Works, Rochester, N. Y.; Honolulu Iron Works, Honolulu, T. H.; Westinghouse Air Brake Co., Wilmerding, Pa.; and Fairbanks Morse & Co., Three Rivers, Mich. He contributed many interesting articles to THE FOUNDRY, including one which was awarded first prize in a contest and which was published in the issue of Sept. 1935. He was a member of the American Foundrymen's association and the American Society of Mechanical Engineers.

* * *

August J. Buenzli, 61, organizer, treasurer and general manager of the Wisconsin Foundry & Machine Co., Madison, Wis., died Jan. 31.

* * *

George L. Lorch, 53, assistant plant superintendent and process engineer, Oliver Farm Equipment Co., died Jan. 23 at Battle Creek, Mich.

* * *

James A. Baker, 94, superintendent of the Indianapolis plant, American Car & Foundry Co., for 23 years, died at his home in Moline, Ill., on Jan. 19. He retired in 1922.

* * *

William H. Thomas, president, Direct Separator Co. Inc., Syracuse, N. Y., died Feb. 10. He had served as an employe and official of the company continuously for 53 years.

* * *

George B. Thomas, 85, connected for many years with the cast iron pipe industry, died Feb. 10 at his home in Cleveland. Mr. Thomas was secretary of the Lake Shore Foundry Co., Cleveland for a number of years and later was made resident manager at Cleveland for the United States Pipe & Foundry Co.

* * *

Samuel R. Limerick, formerly assistant general superintendent, Baldwin Locomotive Works, Philadelphia, died recently in that city. Mr. Limerick had been identified with the Baldwin organization for more than 30 years, and more recently has been connected with the Flannery Bolt Co. of Pittsburgh.

Frank J. McGrail

* * *

Leo O. Smith, 53, for 15 years president and treasurer of the Columbia Machine Works & Malleable Iron Co., Brooklyn, died Feb. 8 at his home in Garden City, Long Island, N. Y. Born in Pipesville, Md., he had been affiliated with the Columbia works about 23 years. Prior to that he had received mechanical training in the railroad field.

* * *

Pike P. Meade, 60, former secretary and treasurer of the Symington-Gould Corp., foundry operator, Rochester, N. Y., died in Rochester Jan. 18. Mr. Meade was associated with the corporation from 1917 to 1930, when he retired because of ill health. Later he was appointed assistant financial supervisor of the Rochester offices of the Works Progress Administration, but illness forced his resignation last September.

* * *

Arthur E. Diamond, 69, foundry superintendent, Lehigh Foundries Inc., Easton, Pa., died Jan. 10 after a brief illness. Mr. Diamond was born in Cornwall, England, and had served 53 years in the foundry as molder, foreman and superintendent. At various times during that period he was associated with the Albany Malleable Iron Co., Trenton Malleable Iron Co., J. L. Mott Iron Works, Trenton Hardware Co., and other foundries in Lambertville and Elizabeth, N. J.

* * *

George Boys, 72, for the past 12 years connected with the Farrell-Birmingham Co., Inc., Ansonia, Conn., died in Melbourne, Fla., Feb. 6. Burial was in Cleveland, Feb. 10. Mr. Boys, member of a long line of foundrymen, was born in Manchester, England, and after the usual school period served an apprenticeship in the foundry under the experienced eye and hand of his father. Shortly after attaining his majority he and his young wife Alice emigrated to Australia where for 7 years he was employed in foundries in Sydney and Brisbane. Returning to England he operated a foundry of his own for several years and also served as superintendent of another prominent establishment. Arriving in the United States about 30 years ago he held positions of foundry superintendent in various plants including a 3 year term with an American owned foundry in Havana, Cuba. He was an exceedingly ingenious and resourceful foundryman and a frequent contributor to THE FOUNDRY on the practical solution of odd and peculiar foundry problems. A paper prepared by Mr. Boys and presented by the late T. D. West at the 1909 Cincinnati convention of the A.F.A., describing the burning on of a large propeller wing, attracted a great deal of attention.

Adventures of Bill

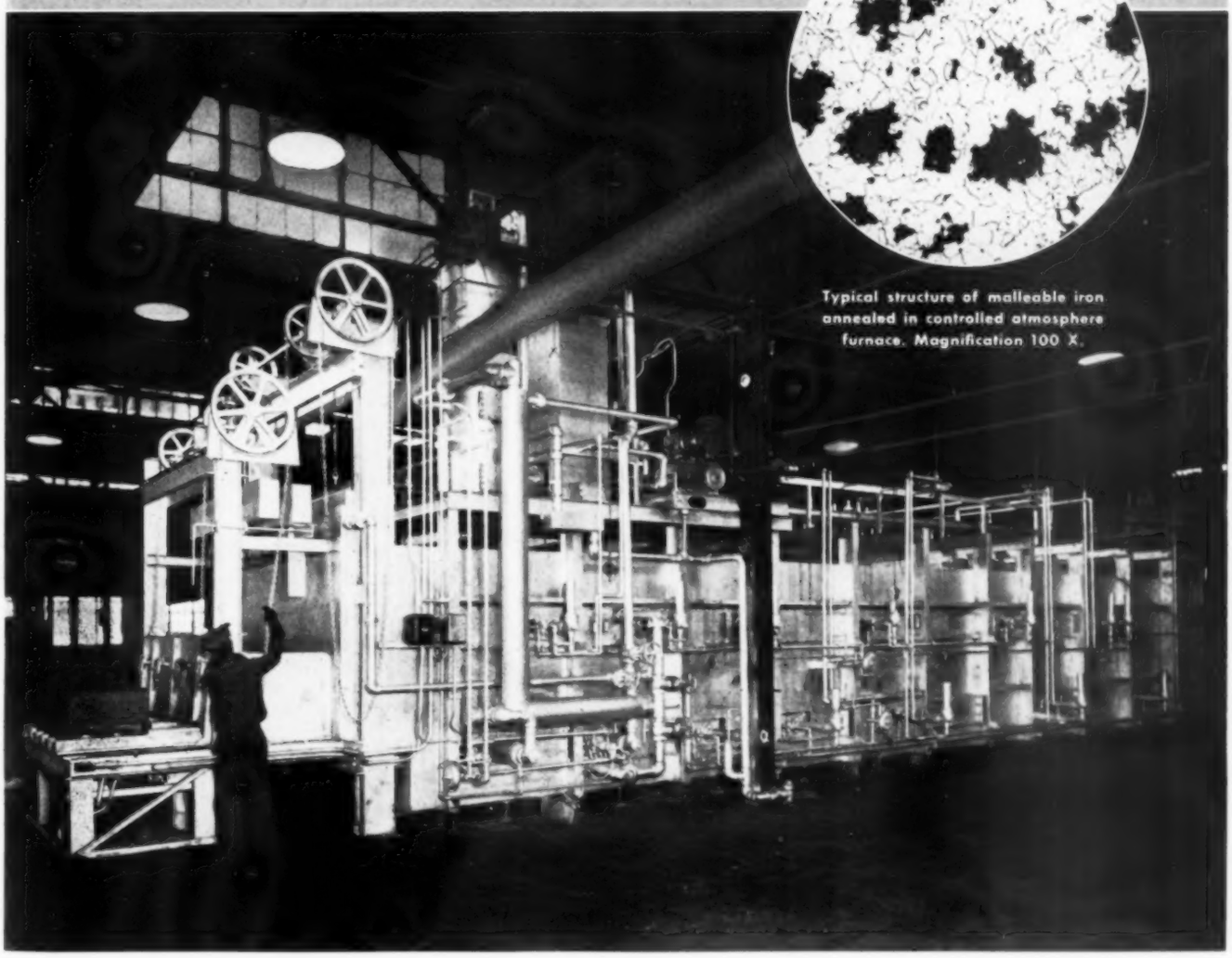
(*Concluded from page* 55)

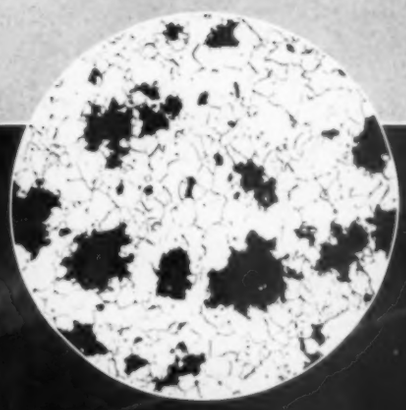
of the most slippery and evasive mind that it has ever been my misfortune to encounter. Wait a minute I shall have to modify that statement. The leading character in *After the Ball* apparently suffered from the same affliction. Listen to this, the third and—let us give thanks—last verse: Long years have passed, child. I've never wed. True to my lost love though she is dead. She tried to tell me, tried to explain. I would not listen. Pleadings were vain. One day a letter came from that man. He was her brother, the letter ran. That's why I'm lonely. No home at all. I broke her heart pet, after the ball!"

"Well," said Bill, "Ill tell you. That song is so intimately associated with the halcyon period of my existence and with a certain brown eyed beauty who shyly admitted that she was crazy about me, that I cannot find a single fault with it. Perhaps if you were to dig up another one—."

"Dig 'em up yourself," I said, "I'm through. GOOD night!"

HOW QUICK CAN YOU DELIVER MALLEABLE CASTINGS?





Typical structure of malleable iron annealed in controlled atmosphere furnace. Magnification 100 X.

INSTALLED at the JAMESTOWN MALLEABLE IRON CORPORATION, Jamestown, New York, this continuous controlled atmosphere malleableizing furnace has reduced the cycle from 168 hours to approximately 31 hours, depending on the iron analysis and furnace loading, thus speeding up delivery. The average capacity is 15 tons per day of fully annealed malleable iron.

The furnace is heated by means of gas-fired radiant tubes... The castings are protected from scaling by a special atmosphere, and are progressed through the furnace on alloy trays by means of a pusher mechanism. No pots or packing are used... A unique feature is the use of rollers on the bottom of the trays instead of rollers installed permanently in the furnace. . . This insures against costly delays for internal repairs.

Operating costs are reduced by the elimination of pots and savings in fuel and labor costs. In addition, the saving in floor space, elimination of the dust hazard, reduction in the quantity of material in process, plus the continuous flow of consistently uniform castings, make this type of furnace desirable.

Write for literature on either the batch or continuous type malleableizing furnace... If you desire, one of our engineers will be glad to call and discuss this type of furnace with you.

SURFACE COMBUSTION CORPORATION ... Toledo, Ohio

SURFACE COMBUSTION

Builders of ATMOSPHERE FURNACES and HARDENING, DRAWING, NORMALIZING, ANNEALING FURNACES for CONTINUOUS or BATCH OPERATIONS

Gray Iron Meeting Is Planned

Gray iron foundry executives plan an industry meeting under the auspices of the Gray Iron Founders' society at the Hotel Statler, Buffalo, Friday, March 25.

The morning program contains speakers of national reputation. After the luncheon, at which visiting foundry executives will be entertained by the Gray Iron Founders' society, there will be an afternoon meeting of the Industry at which matters of exclusive gray iron foundry interest will be discussed and the election of directors of the society for the coming year held. After the meeting the society will hold open house followed by a banquet in the evening. Arrangements are being made to take the visitors to Niagara Falls on the Saturday morning following.

The officers of the society are: President, Peter E. Rentschler, President, Hamilton Foundry & Machine Co., Hamilton, O.; Vice President, R. E. Kucher, Vice President, Olympic Foundry Co., Seattle; Secretary, J. H. Pohlman, Vice President, Pohlman Foundry Co. Inc., Buffalo; Treasurer, Walter L. Seelbach, Secretary-Treasurer, Forest City Foundries Co., Cleveland.

The nominating committee has presented the following slate for directors for the coming year:

District No. 1. (Washington, Oregon, Idaho, Montana, California, Utah, Arizona). R. E. Kucher, Olympic Foundry Co., Seattle.

District No. 2. (North & South Dakota, Minnesota, Wisconsin). W. J. Grede, Liberty Foundry, Inc., Wauwatosa, Wis. and Spring City Foundry Co., Waukesha, Wis.

District No. 3. (Kansas, Missouri, Southern Illinois). C. R. Culling, Carondelet Foundry Co., St. Louis.

District No. 4. (Nebraska, Iowa). H. R. Lafferty, Red Jacket Mfg. Co., Davenport, Iowa.

District No. 5. (Northern Illinois). R. D. Phelps, Francis & Nygren Foundry Co., Chicago.

District No. 6. (Michigan). A. A. Campbell, Dake Engine Co., Grand Haven, Mich.

District No. 7. (Indiana, Kentucky). S. C. Mefford, Auburn Foundry, Inc., Auburn, Ind.

District No. 8. (Southern Ohio). Peter E. Rentschler, Hamilton Foundry & Machine Co., Hamilton, O.

District No. 9. (Northern Ohio). Walter L. Seelbach, Forest City Foundries Co., Cleveland.

District No. 10. (Western Pennsylvania, West Virginia). A. H. Torrence, Indiana Foundry Co., Indiana, Pa.

District No. 11. (Western New York). J. H. Pohlman, Pohlman Foundry Co., Inc., Buffalo.

District No. 12. (Northern New Jersey, Eastern New York). W. P. Laytham, Wm. P. Laytham & Sons Co., Paterson, N. J.

District No. 13. (Connecticut). F. R. Hoadley, Atwood Machine Co., Stonington, Conn.

District No. 14. (New England except Connecticut). M. D. Bingham, Somerville Iron Foundry Co., Somerville, Mass.

District No. 15. (Southern New Jersey, Eastern Pennsylvania, Delaware, Maryland). W. F. Mosser, W. F. Mosser & Son, Allentown, Pa.

District No. 16. (South). E. C. Graham, Acme Foundry & Machine Co., Blackwell, Okla.

District No. 17. (At Large). A. C. Denison, Fulton Foundry & Machine Co., Cleveland.

The officers for the coming year will be selected at the directors meeting immediately following the adjournment of the industry meeting.

Gray iron foundry executives who have failed to receive their invitations and desire to attend should communicate with W. W. Rose, executive vice president, Gray Iron Founders' Society, Inc., 1010 Public Square building, Cleveland.

Labor Crisis Seen

"The Labor Crisis in the United States" is the title of a new pamphlet by George E. Sokolsky, published by John Wiley & Sons, Inc., New York. Mr. Sokolsky believes that the major obstacle in the path to prosperity is labor trouble. We are not suffering from a "strike of capital," he says. We are suffering from an inability of capital to function in the presence of constant political interference and ineptitude.

After outlining the history of the labor movement in the United States since 1869, Mr. Sokolsky compares the philosophy of the Committee for Industrial Organization with those of the old Knights of Labor and the Industrial Workers of the World. He recommends legislation that would adequately define the responsibilities as well as the priviledges of labor unions. Copies of Mr. Sokolsky's article may be obtained from the publishers for 25 cents each.

American Institute of Accountants, 135 Cedar street, New York, has published *A Statement of Accounting Principles*, by Prof. Thomas Henry Sanders, Harvard university graduate school of business administration, Prof. Henry Rand Hatfield, University of California, and Prof. Underhill Moore, Yale university school of law. The book embodies the findings and recommendations of a study sponsored by the Haskins & Sells foundation two years ago.

Celebrates Golden Anniversary

H. Kramer & Co., Chicago, is celebrating its golden anniversary this year. The company has issued a commemorative book, which includes not only a history of the company, but also various data and descriptive materials relative to the production, fabrication and use of brass and bronze casting alloys.

In 1888 Henry Kramer founded the company which bears his name. As demand for the company's products broadened, furnace capacity was increased eventually to 120,000 pounds per heat. Five furnaces now are available for production of ingots of various compositions which are supplied by the firm for use in the foundry.

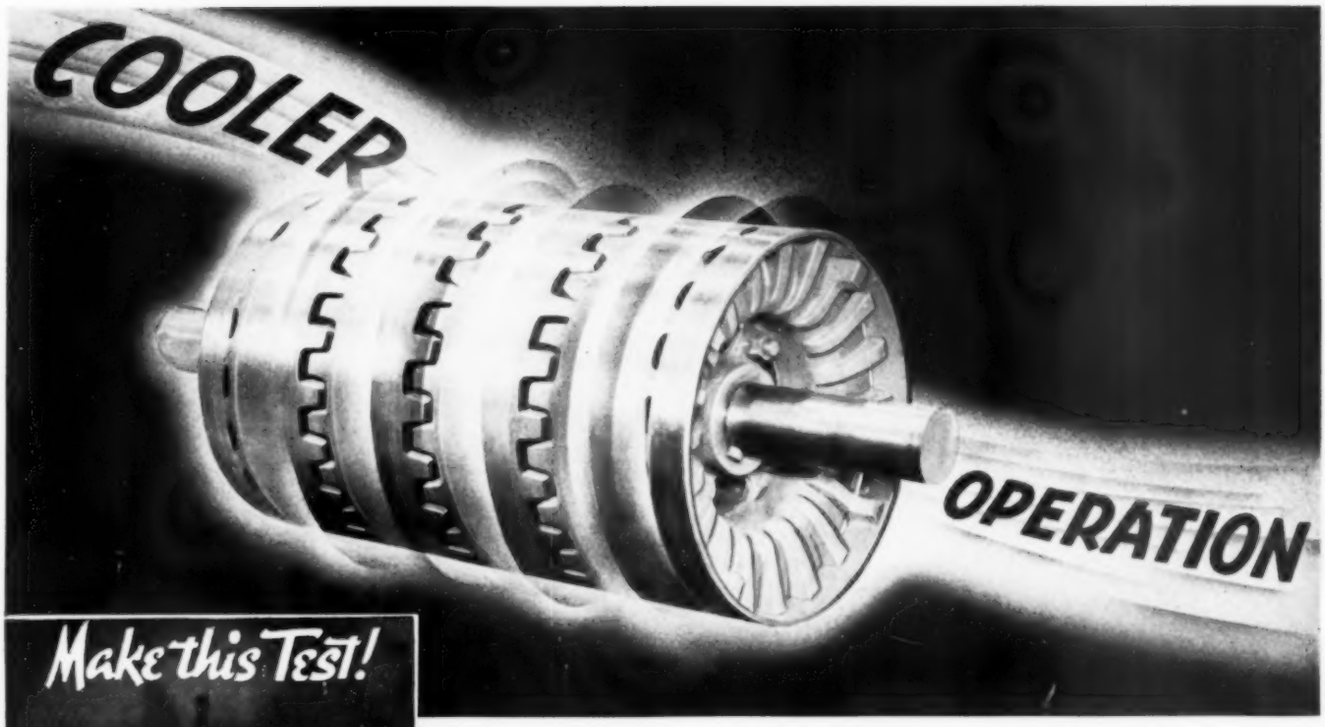
Publishes Index

American Society for Testing Metals, 260 Broad street, Philadelphia, has published a new "Index to A.S.T.M. Standards and Tentative Standards." The index has been designed to be of service to those interested in asscertaining if the society has issued specifications, methods of testing, recommended practices or definitions on a specific subject in the field of engineering materials and the allied testing field. It is a compilation, under appropriate key-words, of titles and serial designations of all A.S.T.M. standards and tentative standards, together with the volume references to the publications in which they appear.

Cites Achievements

A book which presents the career and achievements of George Westinghouse recently has been published by the American Society of Mechanical Engineers, New York. It is the record of a forum held on the ninetieth anniversary of his birth and sponsored by the American Society of Mechanical Engineers as a feature of its annual convention.

The work and engineering achievements of Mr. Westinghouse are reviewed by a group of men, many of whom were his associates. Paul D. Cravath, attorney, New York, who was a long-time and intimate associate of George Westinghouse, honors the memory of *the man*, James Rowland Angell, president of Yale university, reviews the achievements of Westinghouse as factors in our modern life. The complete volume is a unique presentation of the work of the man who perfected the railroad air brake, the steam turbine, and many other modern machines and devices.



SUSPEND a steel screw from string attached to support. Place steel spacer piece across pole ends of ordinary magnet—bronze or brass spacer across ends of similar magnet. With screw in center, move magnets toward each other at equal rate of motion.

Snap! Screw will jump and be firmly held at the bronze or brass spacer. Steel spacers short circuit magnetic lines of force weaken the magnetic pull. Bronze spacers preserve magnetic strength—assure a stronger pull.

Bronze spacer rings are standard in Dings separators—other manufacturers use steel. Reason enough why Dings separators are the strongest separators on the market, size for size.

Dings
High Intensity
MAGNETIC SEPARATION

ASSURES BETTER SAND CONDITIONING!

A MAGNETIC PULLEY must run cool to produce maximum magnetic pull. Hot separators won't separate. Dings pulleys have twice the heat radiating surface of any similar pulley due to special corrugated radial openings, longitudinal openings and an impeller hub design, which causes the circulation of air through the entire pulley structure.

Bronze spacer bands and coil covers which do not short circuit the lines of force with individual coil spools are standard equipment. This makes possible the maximum use of magnetic flux.

The new Dings Magnetic Pulley offers the most positive way of reconditioning foundry sand:—sprues, gates, risers and other scraps of iron are entirely removed. Scientifically developed, over years spent in intensive study of foundry problems, Dings will out-pull any other magnetic pulley on the market, size for size.

Efficient casting production can only be accomplished by using clean sand. Cut down your "rejects" by calling in a Dings engineer, his assistance is available without obligation.

DINGS MAGNETIC SEPARATOR CO.
675 Smith Street Milwaukee, Wis.

Separation Headquarters Since 1899

FOUNDRY ACTIVITIES

THOMAS GRATE BAR CO., Birmingham, Ala., organized in 1910 to produce a line of high grade grate bars of special design, has changed its name to Thomas Foundries Inc. The change is being made more effectively to serve industry with specialized grades of alloyed and plain iron for various purposes. The new company will be operated by the same management with no changes in personnel except for necessary additions to the organization. E. A. Thomas is president and W. D. Webster, secretary-treasurer.

A severe gale recently damaged the plant of the Gohmann Foundry Co., New Albany, Ind.

Moon Engineering Co., Norfolk, Va. recently has been incorporated by W. F. Jordan, and R. Arthur Jett, Citizens Bank building, to operate a foundry and machine shop.

Spring Valley Gray Iron Foundry Co., Spring Valley, Ill., recently has been placed in operation by Jack Destri.

A new wheel shop is being erected in the Santa Fe railroad yards at San Bernadino, Calif. at an estimated cost of $5915.

National Malleable & Steel Castings Co. plant at Sharon, Pa., is undergoing extensive improvements according to recent reports.

Duriron Co Inc., Findlay street, Dayton, O., manufacturers of alloy castings, is planning to build a one-story addition to its foundry to house a ferrous casting shop and grinding department. Cost is estimated at $40,000.

City Pattern Works Inc., Detroit, is contemplating the construction of a new plant on Oakland avenue, Highland Park. Plans call for three buildings of brick and steel construction. Vaughan Reid is president of the company.

Announcement has been made of the organization of the Wilson Stove & Mfg. Co. Inc., Metropolis, Ill. C. P. Houghton heads the new foundry firm, with C. C. Leonard as vice president, Levi M. Miller as

(*Concluded on page* 102)

• Your moulders can do more and better work with less effort when working with Truscon Steel Flasks. The rugged strength of these flasks is obtained by design and construction, *rather than weight of materials.* • Truscon Steel Flasks are easily rammed and shaken out and their low maintenance cost will surprise you. Regardless of size or shape, Truscon can meet your flask needs quickly, exactly and economically.

Send for this new catalog which illustrates and explains important details about Truscon Steel Foundry Flasks.

TRUSCON STEEL COMPANY • FOUNDRY FLASK DIVISION
6100 TRUSCON AVENUE • CLEVELAND, OHIO
SUBSIDIARY: Republic Steel Corporation

TRUSCON
COPPER-BEARING STEEL FOUNDRY FLASKS

RAW MATERIAL PRICES
February 22, 1938

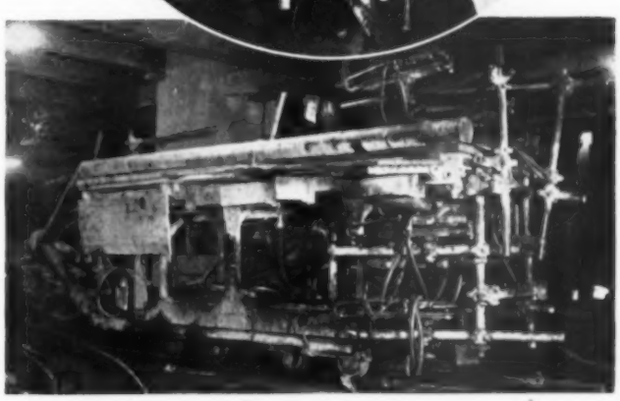
Iron	
No. 2 foundry, Valley	$24.00
No. 2 Southern Birmingham	20.00
No. 2 foundry, Chicago	24.00
No. 2 foundry, Buffalo	24.00
Basic, Buffalo	23.00
Basic, Valley	23.50
Malleable, Chicago	24.00
Malleable, Buffalo	24.50
Charcoal iron, furnace	27.00
Coke	
Connellsville beehive premium	$ 5.75 to $ 6.25
Wise county beehive coke	5.50 to 6.50
Detroit by-product delivered	11.10
Scrap	
Heavy melting steel, Valley	$13.50 to $14.00
Heavy melting steel, Pitts. (dlv.)	14.00 to 14.50
Heavy melting steel, Chicago	11.50 to 12.00
Stove plate, Buffalo	11.00 to 11.50
Stove plate, Chicago	8.50 to 9.00
No. 1 cast, New York	14.50 to 15.00
No. 1 cast, mchy., Chicago	11.50 to 12.00
No. 1 cast, Pittsburgh	16.00 to 16.50
No. 1 cast, Philadelphia	16.00 to 16.50
No. 1 cast, Birmingham	14.00 to 14.50
Car wheels, iron, Pittsburgh	15.00 to 15.50
Car wheels, iron, Chicago	14.50 to 15.00
Railroad malleable, Chicago	14.00 to 14.50
Malleable, Buffalo	13.50 to 14.00
Nonferrous Metals	**Cents per pound**
Castings copper, refinery	9.52½
Straights tin	41.87½
Aluminum, 99 per cent	20.00
Aluminum, No. 12 (Secondary, standard)	16.50 to 17.00
Lead, New York	4.50
Antimony, New York	13.75
Nickel, electro	35.00
Zinc, East St. Louis, Ill.	4.75

IF YOU THINK YOURS IS A TOUGH JOB— LOOK AT THIS ONE !!

One of the four Type W Roto-Clones being used in the construction of the 6th Ave. Subway, New York City

IN the construction of the Sixth Avenue Subway in New York City, four type W Roto-Clones are collecting the hazardous dust created by the powerful drills that are eating their way through the solid rock.

Features of the Type W Roto-Clone that make it equally suited to foundry service are: highest efficiency in dust collection; constant performance under all operating conditions; uniform air delivery; low operating cost; ease of installation; unaffected by high temperatures or moisture content of the air. Ask for Bulletin No. 276 which will be sent free on request.



"Jumbo" drill carriage
In circle . . . Rear view, showing duct connections to Roto-Clone

AMERICAN AIR FILTER CO., INC.
Incorporated
116 Central Ave., Louisville, Ky.
In Canada: Darling Bros., Ltd., Montreal, P. Q.

TYPE W

ROTO-CLONE
WATER SPRAY DYNAMIC PRECIPITATOR

(*Concluded from page* 100)

secretary, and L. W. Sturgis, treasurer.

City Brass & Aluminum Foundry Corp., 424 South Pennsylvania street, Indianapolis, recently has been incorporated by Harry F. Menzel, James J. Mitchum, Michael P. Schaefer and Francis M. Jones, to operate a foundry.

Index of foundry equipment orders for January, according to a report of the Foundry Equipment Manufacturers' association, Cleveland, was 76.8 as compared with 111.2 in December and 190.9 in January of the previous year. Index of shipments was 147.7 as compared with 159.8 in December and 177.2 in January, 1937.

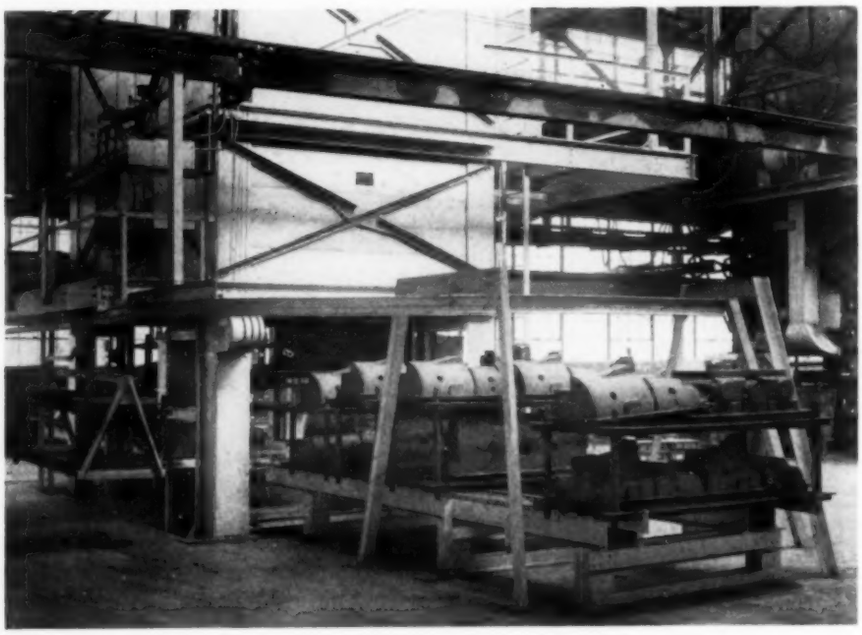
Appointment of a receiver for the Anderson Engine & Foundry Co., Anderson, Ind., recently was made. Meantime, the plant at Jackson and Second streets, which is one of Anderson's oldest manufacturing firms, will be operated by the receiver, Mr. L. Myers.

Simplex Inc., Beaver Dam, Wis. has been incorporated to reopen the foundry and machine shop of the former Rassman Mfg. Co. in that city. The company, which was incorporated by H. L. Kirch, J. D. Hopkins and H. A. Petraska, will produce gray iron castings.

Koppers Co., Pittsburgh, has acquired exclusive rights to the manufacture and sale of valves and other waterworks and sewage equipment formerly produced by the Michigan Valve & Foundry division, Timken-Detroit Axle Co., Detroit. Production will be continued under the present trade name by the Western Gas division, Koppers Co., Ft. Wayne, Ind.

Texas Electric Steel Casting Co., Houston, Tex., has begun an expansion program which will double the plant's steel casting output. Included in the program are: A 1½-ton electric furnace, the addition of 8320 square feet of floor space, an annealing furnace, additional core ovens, and other necessary equipment. All equipment has been purchased and construction is being rushed. The company poured 10,000,000 pounds of steel for the oil industry in 1937.

DSM • CORE OVENS



The above view shows recent installation for Caterpillar Tractor Co., Peoria, Illinois

• The proper baking of very large cores often presents a very troublesome and expensive problem. In the illustration you see a "DSM" core oven that handles cores weighing 930 pounds each, turning them out perfectly baked in four and one half hours! This means perfect air conditioning, circulation and recirculation of heat resulting in uniform heat distribution and definite fuel economy.

Our Engineering Staff will welcome the opportunity to figure on your requirements—either new equipment or modernizing present ovens. Write or wire us.

DETROIT SHEET METAL WORKS

DETROIT - - MICHIGAN

1270 Oakman Boulevard

New Trade Publications

DUST CONTROL — "Picking Profits out of the Air" is the title of a new booklet by Fred A. Ebeling, published by the W. W. Sly Mfg. Co., Cleveland. The booklet explains why dusts are costly and harmful and how they may be economically suppressed.

AIR COMPRESSORS—Schramm Inc., West Chester, Pa., has issued bulletin No. 3815 describing new models, new designs and new features of its portable and stationary air compressors. Specifications and prices are included.

CENTRIFUGAL PUMPS — Goulds Pumps, Inc., Seneca Falls, N. Y., has issued bulletin No. 210 describing its new line of single stage, side suction, ball-bearing centrifugal pumps. The bulletin gives construction data, performance tables, and other information.

CIRCUIT BREAKERS—General Electric Co., Schenectady, N. Y., has published bulletin No. 2450A describing its air circuit breakers for protecting low-voltage electric circuits in central station, industrial, and building equipment service. The bulletin includes connection diagrams and dimensions for breakers.

MATERIALS HANDLING — Mathews Conveyer Co., Ellwood City, Pa., has published a 32-page booklet entitled "Natural Laws Applied to Production." It is a nontechnical essay which states that modern industrial organization is based on the principle of continuous flow. Included are a number of illustrations selected to show the range and diversity of continuous flow systems of handling materials.

AIR POWER—Curtis Pneumatic Machinery Co., 1922 Kienlen avenue, St. Louis, has published a 28-page booklet giving summaries by industries of practical applications of air power which have accomplished the results of speeding up work, reducing man fatigue, increasing production, accuracy and efficiency, and saving time and money. Information presented has grown from 44 years of specialization in the pneumatic machinery field by the Curtis company.